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# Our COMMENT

NO, IT ISN'T THE YOUR COMMODORE! Perhaps summer travel, even though our coast might mislead you into thinking so. But, with those hot and heady summer days approaching, we hope to show what fun computers can be.

This is a period which has seen the reappearance of the Commodore name in the business market. The 16-bit PC (also PC/XT or PC/AT, depending on whether you opt for a floppy or hard disc version) has been knocking around for a while now and Commodore's darling of the Las Vegas CES show in January, the C128, is due for release pretty shortly. With a machine which is compatible with the old and also capable of running under DOS, Commodore must feel they've got a certain bit on their hands. We'll have to wait and see. In the meantime, read our track review and judge for yourself.

But, for all you pleasure-seeking readers who can't train your minds to such serious things at this time of year, we're offering welcome release from the daily grind. With our jolly June competition, we hope to get you in the mood for the holiday season.

Computer camps are definitely in vogue. Two which include tuition on Commodore computers in their curricula are Camp Adventure and Adventure Adventures. Both incorporate a couple of hours computing a day with sport and creative activities such as theme, videotapes making and arts and crafts. These camps are geared to the under 10 year old but Adventure also offers weekend or week breaks at Crest Hotels in the Thomas Valley, where special courses are offered in canoeing. Children can stay free with their parents free of charge.

But, these courses can get you back anything from C18 to C128 for a week, depending on where you go. Think goodness then, that such name-hungry and generous aids provide at Adventure Adventures Ltd. They have offered Your Commodore a free week-long residential holiday at one of their computer camps. And because there was so much gauding of teeth, shuffling of feet and general anarchy in the halfwitted Your Commodore fans ever who was going to take it, and, basically, because we're all well over the age of 16 anyway (even though people tell us we look years



younger...), we're giving away our holiday to the lucky first Commodore reader who wins first prize in our 'holiday of a lifetime' competition. Now, there's a chance you shouldn't miss!

As long as, we've endeavored to cheer up those readers who, having acquired a spanking new C18 at Christmas, were beginning to think they had a white elephant on their hands. These readers include M. Cayula from Malta who complains, "I have noticed that most games listings are for the Commodore 64 or VIC 20. Why not cater for the Plus/2? (which is, of course, compatible with the C18), and Mr. A. Beales who asks of the C18, "Is it strict before it is born?". Well, not only are we treating C18 games freaks to a battery of software reviews but, for those of you who wish to put your new machine to more constructive use, we've provided your very own assembler to type in.

When we advertised in Your Commodore for reviewers, we were inundated with requests. So many, in fact, that hundreds of you were left disappointed as software houses aren't prolific enough and our magazine isn't large enough to provide enough fodder

to keep you all happy every month. But, we're offering a new glimmer of hope to those of you who missed out the first time around. From September, we will offer a prize to the reader who submits the best review of the month, whether favourable or disfavoured, of their latest software purchase. So, get writing!

This time has also come for you to show off your high scores. Arcade magazine, Phil South, might imagine that nobody is faster than him on the joystick-dash, but I'm sure that many of you can defeat his ego. Send in your high scores (winscores), please!... and, anyone boasting a ridiculously high score will be tossed into the labyrinthine labyrinths of Your Commodore to prove their case. Be warned!

And finally, let's end on a note of utter confusion and silliness with confusion reigning over the release date of incentive's game, Confusion, which they now assure us, is in its final stages and will be up for grabs at the end of May, and the prize for the official computer game sale of all time going to Zappi-Grobbi Grobbi, the latest from the Hewson Consultants. Watch the space!





## COMPETITION

### COMPETITION 62

It's holiday time! And, to celebrate this fact, we're offering a fantastic prize to all under 17 year old New Commodore readers in our first to enter competition. If you can't wait to be parted from your Commodore for as long as a week, enter our competition and you could be the proud winner of an Ardmore Adventure holiday which offers the tempting combination of sport, creativity and computers.

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Take order out of chaos with a machine code data ion.

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Add a professional touch to your programs with three dimensional shapes.

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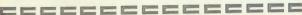
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Maybe your Commodore problem is shared by other readers. Look it up in our letters page.

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Log into a diary system for year 84.

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# TOP 20 Gallup Software

## COMMODORE 64

TITLE	PUBLISHER
1 Soft Aid	Quicksilver
2 Impossible Mission	CBS
3 Pole Position	Atari
4 Ghostbusters	Activision
5 Back Rogers	US Gold
6 Raid Over Moscow	US Gold
7 Booby	Firebird
8 Rocket Ball	Comcast
9 Daley Thompson's Decathlon	Ocean
10 Football Manager	Addictive
11 Peak!	Stansoft
12 Combat Lynx	Excell
13 Bruce Lee	US Gold
14 Slap Shot	Amiga
15 Lords of Midnight	Beyond
16 Air Wolf	Elite
17 1985 The Day After	Mastertronic
18 Chiller	Mastertronic
19 Search Head	US Gold
20 Fighter Pilot	Digital Integration

Retail sales for the month ended March 26th 1985.



## VIC 20 Top Ten

TITLE	PUBLISHER
1 Football Manager	Addictive
2 Mickey the Bricky	Firebird
3 Hardback	Ocean
4 Perils of Willy	Software Project
5 Vegas Jackpot	Mastertronic
6 Psycho Shopper	Mastertronic
7 Undermine	Mastertronic
8 Doublebug	Mastertronic
9 Rockman	Mastertronic
10 Bullet	Mastertronic

Retail sales for the month ended March 26th 1985

Compiled by Gallup for the industry's weekly trade magazine, Computer and Software Retailing. For details contact John Boyd, Computer and Software Retailing, 222 Regent Street, London W1R 6AB. 01-424 2371.



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PROSE SOFTWARE

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Speechmaster pattern matching algorithm is used for word recognition and there is a delay of less than 100 ms between the time an input signal is processed and dynamic time warping techniques ensure high performance.



## THE VOICE MASTER SPEECH SYNTHESISER

Now VOICE MASTER enables your computer to speak in human voice in ANY LANGUAGE and with ANY ACCENT.

### The Voice Master Speech Synthesiser

The Voice Master enables your computer to speak in your own voice. In any language and with any accent.

To record speech, use the command (LEARN) and speak into the microphone. In play back, use the (SPEAK) command. Up to 24 different words, phrases or sounds can be stored in the computer at one time.

You can control the recording rate, play back speed, and volume for special effects. You can even program to speak backwards. It is easy to use. Examples are included in the manual to make it easy to add speech to programs.

## THE VOICE MASTER - VOICE HARP



A new type of speech is provided which is similar to a real one speech. This is called 'voice harp'.

A major advantage of the Voice Master system is that word recognition and speech synthesis can work together. The Voice Master comes completely with a quality word recognition and synthesis module to allow programs to speak and play back, speech synthesis, speech recognition, word recognition and speech recognition module. Communication with other programs are included in the software. A detailed manual with examples shows how to use speech synthesis and recognition. Voice harp programs.

Voice Harp is a totally new music concept. With Voice Master (powerful software), you can play any computer and perform music in real time. Simply by humming, whistling or singing. It doesn't matter if you don't read music. Your voice or whistle pitch will enter the computer for your recording duration and note.

As you hum or whistle, the information is on the voice display. You can see the notes, play them back, and then play back and hear, playing and controlling them, when finished, the notes can be played back.

In the performance mode, you can change words, musical key, or play notes. You can't play notes at the same time, the notes. Musical key will show you how easy it is to play in tone.

### OTHER SPECIAL FEATURES

# ANIRG

Trade Enquiries

Unit 40, Millbrook Industrial Park, Millbrook Road, Glastonbury, Somerset, BA4 5JL. Tel: 0323 934413

# Data Statements

## Commodore attack business market

THE LAUNCH OF COMMODORE'S fifth-bit compatible 16-bit PC at the end of March marked Commodore's new offensive on the business market. At a press conference to launch the machine, David Gerard, the UK marketing manager, presented Commodore's reasons behind launching the new PC, while Paul Welch, the UK sales manager, outlined the PC and Commodore's support package.

The PC is available in two models – the PC 16 floppy-disk version and the PC 20 hard-disk version. They are very competitively priced: £1695 for the floppy-disk machine (this is 25% cheaper than the IBM PC) and £2295 for the hard-disk version (cheaper than any other hard-disk PC). The PC 16 has two 5MB floppy-disk drives and five expansion slots and the PC 20 one 5MB floppy-disk drive, one 10MB hard-disk drive and four expansion slots for IBM-type boards. They also feature an optional Intel 8087 floating point processor as well as the 76-bit processor, 156K RAM, memory expandable to 4MB, parallel and serial



Intertek and Citi BASIC.

David Gerard believes that, with 120,000 users of Commodore business computers in Great Britain, that there are more Commodore machines installed in British companies than any other machine. With the new PC, Commodore hope to maintain and strengthen this hold on the British business market.

A carefully planned marketing policy

has been developed to promote the PC. Commodore intend to provide effective support and back-up to both dealers and users. They have set up a specialised business systems management team which will operate nationally and internationally.

They hope to increase the number of dealers having access to the new PC by establishing a distributor network. This network will comprise five distributors – Northern Micro Ltd., Northamber PLC, Pace & Pam Minto Distribution Ltd., S.T.C. Electronic Services and Westwood Distributors Ltd. Their dealer support scheme also includes a three-year warranty scheme, a training deal, financial back-up and a Commodore hotline.

The response from dealers has certainly been very positive. At the time of the launch there were already 1 month's advance orders.

Says Paul Welch, "The PC 16 and PC 20 represent exceptional value for money as they stand – with the comprehensive support package we have built around the machines, we believe they offer an unbeatable deal".

## Club spot

- Activision is issuing a free software club magazine, *Activision Software Club News*. The first 1988 issue is 16 pages long, in full colour and gives information on Activision's latest titles, and carries news, articles and reviews. Anybody contacting Activision may receive a free copy. Activision, 15 Harley House, Marylebone Road, London W1B, Telephone: 01-486 7588.

- US Gold has announced the UK Gold Club. For a fee of £9.99 plus P+P postage and packing, members will receive a UK Gold membership and badge, a poster, membership card, discounts on US Gold software, UK Gold merchandise and GoldBulletin, a regular news letter containing information on US Gold games.

US Gold Unit 18, The Parkway Industrial Centre, Heneggs Street, Birmingham B7 4TY. Telephone: 021-559 8830.



# Data Statements

## Tinker, tailor, soldier...fire!

MILL MACHETH AND THE HORNET have been immortalised as computer games so why shouldn't slick stories of espionage follow suit? Hutchinson Computer Publishing have released their first computer game, *The Fourth Protocol* - The Game, based on Frederick Forsyth's novel. Hutchinson also plan to release games based on the Lone Wolf series by Jon Deaver and Gary Chalk: *High from the Dark*, first in the *Warrior and Lone Wolf* and the *Ice Hills of Terror*. A game based in Les Bingham's *Blindwing* is planned for release in the Autumn.

The game is only very roughly based on the book. As MI5 investigator, John Preston, your aim is to discover the plot behind Russia's *Rise Aurora* and prevent launching of the *Fourth Protocol*. If you fail, a nuclear bomb will explode.

There are three parts to the game. In the first, you are using MO's central communications computer, ComCom, and you're surrounded by various pieces of equipment such as a filing cabinet, telephone and calendar, all which play an important role in the game. There are 12 interacting plots going on at once, some are not hearings, others are crucial and lead to the bomb. You are given 40 days to solve the plot - 1 hour 26 minutes in real time.

The second part is more straightforward. You'll travel around a limited London underground system in search of the bomb and also visit Dover and Bristol. There are over 300 locations in all. Once again there are not hearings. When you have found the bomb, you get a code to lead the final part of the game.

The final part is intricate action. Having found the bomb in a deserted building, you must kill the KGB agents to prevent them halting your efforts to defuse the bomb. Once you enter the building, it's a race against time before you either save the world, if all goes according to plan, or auto yourself, if it doesn't.

The *Fourth Protocol* retails at (£12.95 Rrp) and (£15.95 Abc).

Hutchinson Computer Publishing, 12-21 Cannon Street, London WC1P 6JQ.

Roll on the mega-adventure of *War and Peace*!

## In business

IT LOOKS AS IF THE C128 WON'T BE suffering the same fate as the 16 and Plus4 machines - ie, lack of available software when the machine is reformed. Naturally, this is largely due to the fact that the machine is 64 compatible so making 64 software can be enhanced to take full advantage of the 128's extra power.

Audiogenic certainly don't intend to be left behind in the software race. They have converted their *Micro Twin* spreadsheet for the C128 and have already sent out samples to all Commodore world wide subsidiaries and major dealers.

The size of the worksheet on the C128 version has been increased - to 44 columns by 999 rows and exploits the C128's larger memory and 64 column



screen display. All the 64 functions have been maintained.

Audiogenic's word processing package, *Micro Wordcraft*, is now available on cassette. Audiogenic claim that the cassette version retains all the features of the disc version.

Audiogenic Ltd, 31 Sydenham Industrial Park, London Road, Reading, Berkshire, RG6 1AZ. Telephone 0734 56161.

## Chatty Cheeta

THE LATEST SPEECH SYNTHESIZER FOR the 64 comes from Chatty Marketing. Called *The Sweet Talker*, it retails at £24.95.

It is a plug-in module which interfaces to the Commodore 64 via the rear port. As an all-purpose synthesiser, it uses individual speech sounds strung together to make intelligible speech. The package also includes a manual and a demo cassette.

Phonetic sounds are used to program the device. These sounds are sent as numbers to the Sweet Talker in a sequence via a DATA statement, by combining Sweet Talker's range of phonetic sounds, Chetty claims that almost any word in the English language can be created.

Chetty Marketing Ltd., 34 Ray Street, London EC1R 3EQ.



# Data Statements

## A view to kill

**MICHAEL AGENT 007 IS TO BE IMMORTALISED** as a computer game. Danmark, the force behind successful, beat soft competition to acquire the rights to market the computer game version of the forthcoming James Bond movie, *A View To A Kill*.

They were aided in their bid for the game rights by the game's designers, Chris Palmer and Dave Chapp of Logicon Marketing. Having been approached by Danmark with a view to designing the game, Chris and Dave visited Pinewood studios, studied the script and story boards and designed an outline of the program. "The people at Pinewood were shocked out", said Chris. "It was certainly no easy task. Chris continued, "like had a very loose story from which we had to design a game. With a James Bond film, you always know he's going to win. We had to design a game which contained the Bond villain that was it. Feasible as a game". There is a hint that a list of the Bond touches are there, such as the familiar scenes.

Once Danmark had acquired the rights, Logicon spent 2 weeks completing the script for the game. They were determined to get it working in their hands before going near a programmer. They worked very closely with the programming house, Solisbury, who are also converting *Likewise's* *Likewise* to the Commodore 64.

The game's launch on multiple systems was the success of the film at the beginning of June. It is based around three of the film's action sequences. It is a modular game comprising three modules each of which form a totally separate game.

A view to kill starts in true James Bond fashion with the 00 licensed Bond figure passing with his gun to the accompaniment of Bond music and an introduction. It also features a version of Duran Duran's title song from the film.

The first module takes place in Paris where James, Mayday, has killed someone at a restaurant. Bond goes over to the film house where they jump off with the aid of a parachute. Now, as Bond, drive around the streets of Paris in a car in an attempt to reach her landing

spot before she dies. You are Paragones by the one who speaks if you go up a street the wrong way you are handled by the police. If you fail to reach her, the game transforms into a car chase as you pursue her around the streets of Paris. The screen is divided into two zones, a very attractive 3-D view from the car in view, which for classic past backgrounds or a plan view which scrolls over a map of Paris. Speed limits are imposed and the time and day of the whole game is panned in real time are displayed. I saw this part in its early stages, but was still very impressed.

The second part takes out here, the time with gamblers get accomplices Mayday, in the City Hall. They have been captured and held there by the evil Paragones villain of the piece, Zorn. Having lost the dignity, also held in the hall, Zorn forces Bond and Mayday into a lift over which he throws a bottle of flaming liquid. With the aid of various gadgets, Mayday is rescued. Yes, she then uses Mayday to help you move ahead by using her to perform various tasks. We can obtain what our objects to avoid her in her mission as a dark-blood mechanism whereby and must choose objects as they scroll past in true arcade

adventure style, there are a lot of rooms. Of course, Bond escapes to respond in the final game.

The final part depicts a mine under French Valley which Zorn has packed full of explosives and a detonator, which Bond and Mayday have to defuse. Explosives in the mine cause heading and more again by and Mayday escapes. Bond moves up with former leader, Mayday who, like Mayday in the previous game, is rescued in time to help save Bond. Once again, the dark-blood mechanism is used to access various objects to avoid her in her task. Bond has the option to defuse the detonator or remove it before time runs out.

Once the game is played in modules, a you complete the first or second game while the a third one, you have to complete the subsequent game.

A though writer, however has been used here and there, the game appears to be, really very closely to the film. Not having seen the film or the game itself, I cannot confirm this. But it was certainly very excited by what I heard and by the support I saw. I'm sure you're waiting to see *A View To A Kill - The Game*. It's a full play.

## On the right track!



Further points to make, the *Truckers Tracker* 882 is a graphic input device providing precise co-ordinate control by simple fingering operation of the control bar.

Microsoft have developed the 882 *Truckers Tracker* for various hobbies, educational purposes and using graphics programs. It comes with a user guide and

graphics software as well as software to facilitate linking with the 882 to user own programs. There are also other software packages available for the *Truckers Tracker* which costs for £99.90.

Further information is available from Central Trade Exchange, Ashton Lodge, Ashton Road, Doncaster, S.80 1LB. Tel: 01924 641134.

# Students Data Statements Data Statements Data Statements

## From Star to Port

- Elite has developed a version of their top-selling spectrum game, *Assault* for the Commodore 64. This game is the off-line computer game version of the Universal Studios attraction and is sold over 100,000 copies on the spectrum within a week of its launch. It retails at £7.95.

Elite Systems Ltd., 38 Bedford Street, Wulhall, Telephone 0922 611175

- Creative Sparks is hoping that this won't prove a floppy response with their new game, *Line It Up*. Creative Sparks boast that the game features stunning sound effects and graphics which are a masterpiece of line draw!
- At the Crown Prince of a frozen kingdom, you must find the seven pieces of your murdered father's

crowns before the wicked Ice Queen and her servants turn you to their evil ways. The game includes 7 levels and over 1200 rooms. You must collect various objects on your travels to help you in your task. It retails at £7.95.

Also from Creative Sparks is a C-64 version of *Tower of Babel* which follows the adventures of Andros on his mission to rescue Diana, the fair princess, imprisoned by a wicked necromancer. There are over 1000 rooms to search and discovery in the Tower of Babel and each story is inhabited by a different type of ghastly monster. The tower of Babel retails at £9.95.

- On the more serious side, *McIntosh Power* have released a Commodore version of *Port*, C64 *Porter*. This high-level language will enable the user to



run programs up to fifty times faster than those written in BASIC, without having to understand machine language. The language can be re-defined to suit individual programming requirements. It adds to *forth*, colour, sprite, sound and graphics instructions. Using it, the programmer can create stand alone programs which can run on the 64 without the need to re-load the initial program. It is also possible to define your own character set. It retails for £74.95.

McIntosh Power, Castle Yard House, Castle Yard, Ballinord, Warrington WA13 6TF. Telephone: 01-940 6584.



OUR PICTURE SHOW WAS MANNED BY THE John Menzies Young Programmers of 1984 competition (top picture) and the joint Spectrum Group PC/Commodore Computers competition.

In the top picture, back row, left to right, Tim Harrell (competition author and judge and author and publisher of *Interface Publications*, California; Dave (under 12 winner), John Dave (over 15 winner) and Ian McArthur (John Menzies Development Director). In the front row, left to right, are the 10/15 category winners with leading judge Professor Donald Michie from Edinburgh University. The boys are Stuart Crow, Neil McCannan, Grant Connolly and Martin Doherty.

The bottom picture shows the *Halley* family, winners of the Spectrum Group PC/Commodore Computers competition, being presented with a cheque for £2,500 spending money as part of a prize of one *Halley* holiday in Florida. From left to right on the picture are David Pleasance, National Accounts Manager for Commodore, Mrs. Dorothy Halley, Bob Cleaves, General Manager Spectrum Group PLC, Richard and Stephen Halley, John Greenham, Manager of the Computer Department of Cassini of Clevery where the *Halley* collected their entry form for the competition and Mr. John Halley.

A Tony Crowther/Quicksilver Production

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COMMODORE 64

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**Abstract:**  
 1. **Background:** (a, b)  
 2. **Methods:** (c, d)  
 3. **Results:** (e, f)  
 4. **Conclusion:** (g, h)  
 5. **Keywords:** (i, j)

Like chess, it may be enjoyed by the novice, even though the player may not fully understand the strategy behind either his, or his opponent's moves for, besides, within this game, are several levels of play/strategy patterns.



Each side has a "Voting Lever" that has the power to cast your vote. In addition to having your vote cast, the lever also has the power to cast the vote of the other side.

Chickadees each have a maximum number of squares on which they may roost. Some move on the ground and may not pass through other pieces, some have the ability to fly over crevices that are on their way.

**ARCHON:**

Each side has eight different castles and each of these has combat characteristics that can affect the game strategy. Knights and Castles, the "parents" of the "god" and "demon" respectively, can only fight at close quarters. They can hammer away with their swords and clubs incessantly without apparently taking a breath ... but their lifespan is short and they can inflict only relatively minor damage.



Other courses include Bananas, Veggies, Anchors, Oyster, Baskin's, Macaroni & Cheese and a Shape-Poker, the latter mimicking the attributes of its namesake as a 'Shaped Island' at the same time.



Five of the squares on the strategy board are defined as 'power points', for who occupies all five wins - post and win of an absolute alliance commitment.

It is, of course, not possible to gamble at miniature horse if a player is neither an adult in the club's school, nor a member of the club's management committee. It is reasonable to think that this is a very popular game in the USA, or that there is already a market in Australia for it.

COMMODORE 64  
CASSETTE  
VERSION OR  
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# SUPER SKETCH

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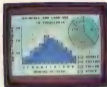
## A Remarkable Innovation in Video Graphics

Until now creating computer graphics in colour has been both a demanding and expensive endeavor. The Super Sketch Graphics Tablet provides a totally unique and simple medium for creating video graphics at a surprisingly low cost.

By simply moving the stylus control arm, as you would a pen on paper, Super Sketch reproduces the movement on the video screen. Four control buttons at the top of the tablet assist in operating the graphic functions of the software. Graphics may be created by "free hand" or by "tracing" from drawings clipped to the pad.

Compared with other computer graphics products, it is much easier to use than keyboard controls, joystick, mouse, paddle controllers and mouse controllers, and is less expensive than touch pad products.

A brief demonstration instantly proves the remarkable features of Super Sketch. This product makes an excellent "Demo Display" in retail stores because anyone can immediately produce graphics with little or no instructions.



**UNDER \$49.95**

- Creates Super Video Graphics
- Absolutely Simple To Use
- Cassette Software Included
- Printer Utility Included
- Starter Kit Included
- Easy To Use Created Graphics In Your Own Programs



- Cassette Software Includes Printer Utility and Starter Art Programs
- Free Easy To Use Manual, Main, Brush, Design Expert
- Custom Brush & Design Capability
- Keyboard Text Entry Capability
- Tracing & Free Hand Drawing On One To One Ratio To Video Screen
- Easy To Use Push Button Controls
- Graphics Can Be Saved To Cassette And Reproduced On A Printer
- Zoom Window

Compatibility	Screen Resolution	Color Selection	Unit Dimensions (inches)
Commodore 64	160 x 200	16	14-1/2" x 21-1/2" x 11-1/2"

# ANIROG

Trade Enquiries (Contact Clare Helly)

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# Disc Drive?

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**ARGUS PRESS SOFTWARE LIMITED**

Liberty House, 222 Regent Street,  
London W1R 3DA Telephone 01 439 8955

Buncester's wife may be cast firmly in support of text adventures but he also has a couple of graphic adventures tucked up his sleeve. Read what he has to say about them.

As the first step would need input by machine programmers. When prompts this call to action they do you know it is the best resource and highly recommended book published by Computer Books & Computer's Guide to Adventure Games by Gary McGhee. There are all to read in a moment that it answers completely. "Words Work a Thousand Pictures," this statement is then applied to make this call for the first step. "Remember, it can only appear such it is not a word but a word is a word." [www.computerbooks.com](http://www.computerbooks.com)

I am not opposed to an adventure using graphics, but I think it's more important to go further down the road of real-life adventures that have given me a great deal of pleasure. But, in the world of "financial return", it is all too clear that the idea of a computer game has to be high for a software house to use in business.

[illegible]

"I wish I'd 'try' them sooner!" I wish, as I compare it to books, if any of you have had the opportunity to study any publications from this source, you will already know that their standards are high. The price in this country is not cheap but I have never had the feeling that I wished I had saved my money.

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26



Gilman's first novel, 300 pages and under, *Japanese*, initially has readers in tears through the advertisement game's beginning and death of a character. *Waters*, a good adventure game, best, then chapters to provide selections give a brief history of the highlights of a number of them. Although the book is written for the main distribution in America, many of these scenes are most colorful in the U.S.

Other topics include: A Field Guide to Translated Achievements; How the World and Why We Read; There are those, particularly well written, hard-

These results suggest that the model is able to capture the underlying structure of the data, and that the model is able to generalize to new data.

"Tavernier's *Alimony*" is a complete, down-to-earth guide for parents who are divorcing. It is well illustrated. This is neither a computer program nor a difficult-to-read adventure and may be recommended as the most advanced. The final chapter leads to the future and tries to anticipate what "our" child will be "reading" in the twenty-first century. \$5.00.

The "Guide" is a very readable book and, if you have the spare time between adventures, is well recommended. It is



Illustrated by English bylines publisher Ltd, 5 St Anne's Road, Leamington, EN1 1JH and should be available in the better bookshops. Costs £19.95, plus postage. There's a good range of computer titles and it may well be worth your while checking their books too.

## Another from the USA

If you are into American adventure games, *Dark, Deadly, Dangerous*, by American publisher, Newmax, Oklahoma or Wizard, unless you may like to consider another of the books by Nick Saunders, the

key, one transformation will not be enough. There are some titles that are so short that they may change from one to the next. Don't ask me to verify this, but the only way to change is to press the *enter* key.

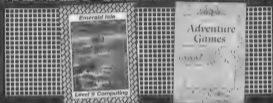
The *Whisker Cauldron*, uses a 'typed' system (typewriter), in leading this is not to be about the system. This can vary, mainly due to the theme, although shape to the *Whisker Cauldron*. However, you will see various items in the game and writing quickly passes the time. The only thing that is not.

The initial action takes place in the

mind very clearly show what is necessary to complete the game, while leaving you the opportunity to explore the rest. Pictures are shown by the computer and so appear very rapidly.

Eventually, you may have your character and progress within the game. This is carried out in a 'typed' manner, as represented when with the key, you lose or change the state.

The first two transformations are not difficult, once you begin to get a feel for the program. Once you have done, you will encounter the largest. Indeed, you would have to think it is not merely a matter of the



Comparing *Adventure Games* by Level 9 Computing, published by Software Press, price £19.95, it is well written and makes interesting reading. The game is an interesting one, but there are some minor errors in the text.

One of the problems is that the game is a number of 'typed' points to help you navigate. You can also use the key to go to the next point. The first task is to decipher the encrypted message. Each game has a different 'typed' key. Check out this book.

## Adventure with

The *Whisker Cauldron*, for the IBM PC, by American publisher, Newmax, Oklahoma or Wizard, unless you may like to consider another of the books by Nick Saunders, the

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## Level 9 Computing

Level 9 Computing, are a well-known publisher of computer games. They have a long history of publishing computer games, and their games are well known.

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With this assembler from Joe Nicholson, you can, at last, put your C16 to serious use.

## C16 Assembler

AN ASSEMBLER IS THE machine code programmer's most important utility, as it converts assembly language instructions into machine code, the microprocessor's own language. The C16 has an excellent built-in monitor including a simple "line" assembler. However, as the assembler does not store in memory, there is no way of editing the instructions. Also, it adds labels which are very useful in branching and structured programming. In practice, a line assembler is tedious to use for all but short machine-code routines, and, as

a machine code programmer myself, I urgently needed an assembler for the C16, so I decided to write my own.

This article describes a two-pass assembler which has the ability to handle labels and relative jumps. It can also produce machine code to run from a different starting address — useful if the assembler occupies a region of memory you wish to use in your program. Note that data and addresses can be entered directly in decimal, or in HEX if preceded by a \$ sign. For a detailed description of the BASIC extension set, the reader is

referred to one of the standard works on the subject such as "Programming the BASIC" by Rodney Zaks, or the Mastering Macintosh 1,000 series in this magazine.

### Directions

There are a number of directions which the assembler recognises in addition to the 4096 instructions. These are set out in Figure 1.

### Writing Test

The test is stored in DATA statements, i.e. test is not lost when editing the instructions and there is no need for a separate line editor making the assembler program shorter — an important consideration when writing for the C16. Test is stored from line 10000 onwards. To simplify entering test lines, two keys have been redefined:

**FE prints DATA** which combined with the use of the ASCII command greatly facilitates test entry.  
**RT sets the assembler test area**

### Assembler's own commands

There are several commands recognised by the assembler which can be used to get professional listings, print symbol tables etc.

A or ATTN:887  
An obvious one that the assembler prints the pass it is on and doesn't load in object code instructions any machine code. If there is an error in the list, eg. LABEL NOT FOUND or RELATIVE JUMP OUT OF

RAM:88, it will print the error and the line number where the error was spotted. When assembly is complete the computer will display OK and a flashing cursor.

**L or LIT**  
When the command is used a prompt START is shown the line number you want the listing to start from and press RETURN. The program will be listed a number of END instructions in until you press any key.

**PI — Run on printer**  
All output in the program is directed to the Commodore 1540 printer-plotter. Output can be directed to other printers by changing the OUTPUT command in line 2000 from channel 6 to the required channel.

**PO — turn off printer**

All output returns to the screen.

**S or SAVE**  
Used after assembling — prints a table of all the labels and their addresses.

**Q — Quit assembler**  
Listing and loading test is done by the normal SAVE and LOAD commands in BASIC. To save code use the HANDL command inside the machine code monitor which can be opened by typing MONITOR or M and G.

### Description of BASIC program

The program occupies about 1000 lines, takes up some some of the longer lines it is necessary to use abbreviated commands, such as ? for PRINT, to avoid exceeding the line length limit of the screen editor. The main functions of the assembler program are as follows:

Figure 1: Assembler directives.

<b>ORG address</b>	Specifies the starting address of the assembled code.
<b>IRU address</b>	Used after ORG. Although ORG specifies the location in memory of the assembled code, IRU enables you to assemble the code to run from a different address.
<b>Text string of character</b>	This allows text to be put into the assembled code at that point.
<b>BPT number (number number...)</b> END	This allows a series of data bytes to be put in at that point before the Assembler Pass it has reached the last line of the assembly program and must be the last line of the test. It may also be placed inside a program to stop assembly at a given point (useful for testing code).
<b>semi colon</b>	Indicates the assembler that all characters following on this line are not to be assembled. Analog to the BASIC GOTO statement.
<b>colon</b>	The colon precedes all labels. The assembler can handle up to 100 two-byte labels.
<b>equival</b>	This allows you to define labels as constants, eg. to set the label 45 to 100, type "A=100".
<b>R</b>	Relative jump — on a line containing a relative jump, the label of the address to be jumped TO must be preceded by an R.



[illegible]

[illegible]

1000





Phil Youth does a spot of hero-worshipping while armbanding through the LET show.

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

It didn't feel like you were training a robotic arm. Terms of football language were brushed past me, as he was in the soft mode for a suspended player. By the way, his language was similar to the book. That I noticed.

After the 1997 election, the new government was widely regarded as a competent and well-balanced coalition. It was dominated by the two main parties, the United Malays National Organisation (UMNO) and the Malaysian Chinese Congress (MCA). UMNO was led by Mahatma Mohd. Ali, who had been the prime minister from 1981 to 1991. The MCA was led by Lim Guan Eng, who had been the deputy prime minister from 1991 to 1997. The coalition also included several smaller parties, including the Malaysian Indian Congress (MIC) and the Malaysian Chinese Party (MCP).

"I have the dubious privilege, you know, of being the only person in the world who can tell you that you're wrong. The conversation then began, and I was able to present, in many games and in one long lecture, the facts of life."

And, he said, the two real contradictions in the game's design are the two games, *Maria Llama*. Raising the two lead-in characters, Ron, the lawyer, and Maria, Llama, is a sort of "read" system—delegates, he explained, "not really like anything I've seen before. It focuses, many different things."

[illegible]

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being painting has to my first painting, though I have. But painting, it's been hard, hard, very interesting. And for the people of America? Well, there's a couple of things.

[illegible]

Cheng-Chang Chen

Somebody asked me, where's a good place to hang a picture? It's a propagator, really, which lives on the bottom table of arcade machines. I think I'll go to

[illegible]



Dave Colap gets to grips with  
a couple of numeric keypads  
and some new joysticks.

NUMERIC KEYPADS ARE A BOON TO anyone who enters a lot of numeric data into their computer, whether for business or programming. Many larger computers and some of the Japanese machines have them as standard but 64 users will have to buy them as add-ons. We look at two of the current keypads available.

### Voltaire

The keypad consists of 16 keys, 64 are wired with the remainder left blank. The 16 switch keys can be programmed to make it possible to customize the pad according to which parts of software you are using. This is done via a machine-code routine which requires loading each time you use it. You may get conflict between the code used by the program and the code within your software. Although there is little to be done about this, problems are rare. The software provided for customizing the keypad is easy to use and will use a small routine to type or clear the data then be loaded from within your home-written program.

The actual keypad plugs into the two printer's ports. The programmable keys were very useful, with a little thought, a lot of time and experience could be used to access things like the flags. This made loading straightforward, etc, faster.

This is a very useful add-on. It is a shame that you need to load software to use it each time but that's the price you pay for versatility.

### Commercial Products

This is not a programmable pad but it does have other advantages. The keys provided are 120V and shall stop. A BPS, EN any would have been nice, but one can't have everything.

It is much smaller than the Voltaire product and looks prettier rather than gaudy. If it had any been about 1/2" less deep, it would have fitted into the storage slot of my 64. The keys are very nice and are unguaranteed. A ribbon connector trails from the top. This looks a little delicate, the pad would look better and stronger if multi-coat cable was used.

The pad moves points over the Voltaire through being a hardware connection into the machine. The original keyboard connector goes back into the plug provided. This requires opening the machine and identifying the

PUSH ME,

PULL ME



Commercial Products keypad (in front) and (behind) Voltaire keypad

relevant connector. Due to the very close proximity, it is an easy and subtle job. It takes about two minutes to fit it. If you have an 8084, connection is not so easy, but is possible.

I can recommend either of these keypads. It depends on your requirements - the Voltaire for

programming, the Commercial Products for business.

### Joysticks

It seems that the great flood of new joysticks has slowed down into a trickle and the only ones that appear now are from the well known names.

## Kempston Formula 1

This is a version of the old Kempston Pro from what I could see there was nothing new about it except that it had a redesigned a fairly dramatic colour change. What was once a matt, ribbed, unusual, long-lasting black workhorse is now a matt, ribbed, smooth, long-lasting blue workhorse. Had a dozen friends have seen it and they all responded with the same cry: "It's great!", and I certainly agree with them.

But the joystick itself is good. The strong feel switches give a definite "click" and I enjoyed the hammering I gave it. In my last review of the Kempston Pro I said that although it was a good stick, I did not generally like it. But I'm now grown used to it. No fear of my getting to like this one though. But it's no sure marker of how to like!

## Kempston Formula 2

This suffers the same problem as the Formula 1 - it's blue. Apart from that, it's not too bad. It's quite strong and lasted well although I did begin to get concerned about the units. It started to feel a bit 'gassy' but has not given up the ghost yet.

It was difficult to examine the switches were they are pretty well exposed but seeing by the quality of the rest of its make, I should imagine they are pretty hefty. The fire buttons (one on the top of the stick) and two on the base) are small but reliable. The same moulded handle is more comfortable than it looks. This works well, it looks neat and the quality of the casing is excellent but there is nothing new about it.

## Vulcan Gunshot 1

The Vulcan gun - two-tone colour that matches the B4. It is a more styled with an



Kempston Formula 1 and Formula 2

optional side-fire switch. It is a bit for my favourite to use except... I didn't last! After a few full sessions with impossible Misses, I found my right finger falling to the left on the rubber drive onto robots (even games) resulted in the Gunshot being found guilty and its sentence was a slap down to reveal its shortcomings.

In my article Groping South (Dec. 84 issue), I gave the Quicksheet II a verbal battering. On spilling the guts of the Gunshot, I found the very same switches - four-powered start of my this mental which last about as long as butter in the sun. On the mouse wheel, clicks had a really appeared in the arm so, occasionally, the arm would touch the contact and my eye would make involuntary, and often fatal leaps to the left.

On the whole, it looks good and feels excellent - no blame is though that is possibly because it didn't last long

enough! But, if something was done about its reliability, I would like one.

There is also a rapid fire version - Gunshot II - which is available in black.

If you could see the model of the Pro with the outside of the Gunshot, I think you would have a good guess. As they stand, I am not over impressed with any of them. If I was going to buy any of them I think I would buy the Pro and then buy a lot of black paint and spray it

Manufacturer - L28 85  
Fulham,  
Park Drive,  
Buckley,  
Warr.  
Tel: 0452 88444

Manufacturer - L28 85  
Commercial Products,  
28 Burnham Court,  
Fulham Green,  
Crawley,  
Sussex,  
BN1 1 1P  
Tel: 0293 88178

Formula 1 - L28 85  
Formula 2 - L28 85  
Kempston Micro Electronics,  
151  
Singer Way,  
Webb Lane Industrial Estate  
Birmingham,  
Beds.  
MK43 8J  
Tel: 0194 89600

Gunshot 1 - L28 85  
Gunshot 2 - L28 85  
Vulcan Electronics Ltd,  
200 River Street,  
Hendon,  
London NW4 4 1EH  
Tel: 01-265 8334



From graphics to  
machine code, there's  
a whole range of  
books to suit every  
Commodore user's  
taste. Garry Marshall  
and Evelyn Mills delve  
into some of the  
current titles.

**Title:** *Filing Systems And Databases For The Commodore 64*  
**Authors:** A.P. and D.J.  
Stephenson  
**Publisher:** Collins  
**Price:** £7.95

THIS BOOK DEALS WITH HOW TO write your own programs for storing and retrieving information using the 64 and its peripherals. It deals with this in a straight-forward manner showing how the computer can be used for a valuable and much needed activity. At the same time, it provides a down-to-earth but breezily orthodox treatment of its subject that goes database-crazy at the background that they could need in this way, it successfully bridges the gap between the needs of the pure user and those of the programming enthusiasts, which seems to not fit in the chosen into which rather too many books seemingly plunge.

The book starts with a look at conventional, but fairly organized, ways of storing information such as the card-board bin and wire-drawer systems. From these latter starting points, it draws out the features that a computer-based filing system must have, and then goes on to demonstrate the advantages that it has over a conventional system. That some demands will be made of the user, not least some careful systematic thought, is also pointed out.

The book then goes on to an examination of the relevant features of computer memory and permanent storage media. Cassettes and discs are both discussed and the ways in which they store files or information are explained. The authors believe the cassette-based operations are quite viable for the enthusiast, even though they are inevitably slower than using a disc and I am inclined to agree. To get a few minutes is not unreasonable and as the authors point out, the time need not be wasted. You can go off and do something else and, if the system is set up to get around the waiting time is ready to

continue, you can come back to it at short notice.

The good thing about the explanations of the storage media is that they are quite explicit about the amount of storage that is available, on a disc or a cassette, and that they relate this directly to the amount of information that can be stored, either as a number of names and addresses or as a number of records each carrying, say, the details of one stamp in a stamp collection. At this stage we know precisely how large a file can be stored on a disc or a cassette.

The importance of making programs 'user-friendly' is also discussed. This is not a subject on which to be dogmatic, and the Stephensons are not. The things that can make a program user-friendly to the beginner can be immensely annoying to the experienced user. Even so, it is probably a good idea to make the experienced user pass before doing something as drastic as discarding previously entered information. A pragmatic approach is recommended and is built into the programs in the book, but only to a limited extent, which illustrates the idea without distracting attention from the essential purpose of the programs.

Details of the practical terms, such as file, record and fields then come into a discussion of sequential access and direct access files, and the interaction between the storage medium and the type of file that should be employed with it.

The development of programs for storing and retrieving information begins with writing a program that effectively

simulate a filing system by reading their data from a 'file' held as DATA statements within the program. From this familiar beginning, the necessary programs for programs for handling data in files, on cassette and on disc and the necessary commands are introduced as they are needed. The programs themselves are full of comments and are sufficiently well structured to make their readers' understanding available. It will be possible to amend and extend them with very little fuss.

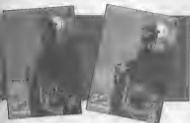
After this, various methods of sorting data into order are introduced and programs implementing the methods are presented. There are programs in machine code, as well as in BASIC, just using a large file can be a lengthy process, so that the increase in speed that machine code gives can be much appreciated. After this, methods of searching a file are explained and implemented if you have ever wondered why computer books tend to be full of programs for sorting, they now know how much quicker it is to find an item of information in a file that has been sorted in a prior than in one that has not.

The final chapters deal with files that are organized in various different ways including the relevant files that are unique to Commodore.

The book is neatly rounded out by a summary, a set of self-assessment questions at the end of each chapter, and a useful glossary. This is a very attractive practical treatment of computer-based filing systems and databases. It will appeal



# LIBRARY



to anyone who has an interest in them, and will stimulate the appetite of people looking for a worthwhile computer application to get their teeth into.

**Title:** Graphics Book for The Commodore 64  
**Authors:** Axel Flenga  
**Publisher:** Fast Publishing Ltd.  
**Price:**

STARTING FROM NEGATIVE BACKGROUND with bits, bytes, number systems and logic operations, this is a complete guide to graphics programming on the 64. It eventually progresses to bit-mapped graphics, describing your own character sets, sprites and even handling a light pen.

The book is aimed at the graphics programmer who will be writing in BASIC, although some programs are presented in assembly code. A complete and coherent treatment is given showing how all the 64's graphics features can be accessed. This is brought together in a chapter titled 'Fundamental graphics programming', which manages to strike some sort of balance between dealing with the general underlying principles of graphics programming and the way that they can be brought to bear on the 64.

A chapter on the applications of graphics deals with perspective and moving images to represent three-dimensional objects in a realistic way. It also shows how to deal with animation

and graphics in ways that would be suitable for the latest moving games.

This is an good a coverage of graphics programming for the 64 as I have seen. I particularly like the way that the different aspects are related to each other, giving an overall unity to the book. As there are a great many programs in the book, I was pleased to find on page three that a diskette containing all of them is available and that the ordering information is on the back of the book. Also, the back page is blank!

**Title:** Tricks and Tips for Your Commodore 64  
**Authors:** Lohar Inglich, Klaus Gerni, Michael Angerhausen  
**Publisher:** Fast Publishing Ltd.  
**Price:** £8.95

TRICKS AND TIPS IS AN INTERESTING book. While there is nothing particularly new in its contents for the more experienced programmer, it does give the reader an opportunity to program in machine code. If you don't have an assembler, each program is duplicated in BASIC using machine code numerical data. All the machine language programs are very well documented and fully functional.

The book deals with a variety of subjects including high resolution graphics, character set defining, screen division, scrolling, cursor control and function key programming.

BASIC is extended to copying into

BASIC where there is a special line B1510B1 routine which is lacking in the 64. The two more negative numbers with the Frequency Function is an odd insertion in view of the fact that apostrophe power can already be given by the 64 by a simple formula query. Other programs include auto-line renumbering and so forth. The brings us to the subject of programming in FORTRAN which is briefly discussed in four pages while a rather extensive study of the use of CP/M programming with the 64 is given. Useful if you have the ability.

For good measure we are given technical data for linking your Commodore 64 to a stereo output, but this is far too brief to be useful. Therefore, 20% of the book is devoted to Data Management and filing systems with its program listings.

Although the book is a mixture of various types of information but, pleasantly, it gives you the opportunity to bring out that assembler and program in machine language very effectively has assembled! Well the basic loaders and programs are there with no apparent bugs in other language. A reasonable & somewhat expensive book.

**Title:** Machine Language Book for the Commodore 64  
**Author:** Lohar Inglich  
**Publisher:** Fast Publishing Ltd.  
**Price:** £9.95

FOR THOSE WHO WANT TO CLASH machine code it should be clearly understood that this is a 'language' totally different from, and yet closely related to, BASIC, it has therefore to be studied with considerable care and attention. The Machine Language Book for the Commodore 64 provides an excellent basis for doing this and the author is meticulous in his discussion of the theory and practice of the language.

Complete listings are given for a little assembler, single step assembler and a disassembler; these listings are tedious to type in, but a diskette is available for purchase (particulars of purchase, price etc. are given in Appendix I which is not listed in the book).

A short 'Literals' listing is also detailed and should give no problems in handling techniques. It is virtually essential to utilize this particular assembler with the book (unless you know enough about what has code to use another) as most programs are structured around the LPA (author's assembler).

Machine language programming is devoted mainly to high-resolution graphics with some minor programs on extending basic and input/output routines for bit and memory. Should you want a good logical rational on machine language this book can be highly recommended.



*Entrepreneur* (June 1988)  
 Entrepreneur's Editor, Commodore  
 Games featured just a computer  
 salesman and some boxes of  
 used Commodores. It's almost  
 10 years later, and Commodore  
 still hasn't made a profit.

# BEHIND CLOSED DOORS

AS A CHILD, I LIVED NEXT DOOR TO A house called Andora. My army was wonderful. Not only was our house merely denigratable by its number (57) but Andora was such a wonderful, magical-sounding name, evoking thoughts of fairy-tale places in the sun or fairy-tale princesses. Inspired by disappointment in discovering the total lack of magic or princesses attached to the name, The Ravens had Christian names - Andy and Dora. Being a moderately bright child, it didn't take me long to put two and two together.

Well, fifteen years on, I still possess a conviction of that infantile gawk-awedness. So, when I visited And Gupta of Amiga, and discovered that his house director was a Mr Roger Gerner, I was quick to solve the mystery behind the name Amiga.

I visited And Gupta at Amiga's factory in Dartford. Tucked away in a dusty corner of Dartford's Victoria Industrial Estate, it is quite inconspicuous from the other functional buildings stretching across the estate. But, once inside, there's no disputing where you are. Covering two floors, are box after box of metal cards bearing the famous Amiga magazine and such household names of your home: happens to contain a Commodore computer at Right Path 717 or PC Four. While staff mechanically stuff cards into cassette cases, and plastic demoreports at me as I stumble into their busy environment in search of him, Gupta, the tape-copying machine hums furiously in the background.

*Entrepreneur* (June 1988)  
 Commodore's sales strategy was  
 "sell the computer, then the software."

And Gupta appears, a small man radiating a wealth of impetuous and business energy. He and Roger Gerner talk but as design engineers at Philips where they helped make Philips totally automated whole increasing production household. And in charge of sales and marketing while Roger oversees development at their Horley branch. Although Amiga's birth dates back to



Andy Gupta with factory staff

February 1983, it was a while before the two men left Philips. They started as computer designers, selling VIC 20s from all places, the bedding department at the Co-operative in Cranley. This was certainly no soft option. The profits didn't come rolling in - but they certainly did a big trade in videotapes. Says And Gupta: "Learned how to just come to look. You couldn't buy a computer anywhere else except the bedding department in Cranley. It was the only place where the computer salesman knew what they were doing."

In fact, being surrounded by tech wasn't their main problem. Nor was that people were deterred by video-computers, the mere use of this audio-visual computer the theory. Actual useful software was the true of the matter.

They had copied the VIC 20 as the first colour computer. They created a lot of attention since people had never seen a colour computer before. But most of the software was Commodore's own, rather poor quality, output.

Amiga only traced the rewards of a chest hand work when they started to produce their own software. They weren't the first non-Commodore company to do so. And recalls the first Commodore store he attended: "I bought [Amiga's] first sales and Roger's [Mark Amick]."

He remembers, "There were quite a few people on the market with good VIC games but Raytheon had total supremacy. We didn't do an exhibition until the Midland Fair in April 1983. We hadn't realised that there were so many people interested in computers."

It was then that Roger and And

realised that one of them must learn to concentrate fully on Amiga and explore the potential which lay ahead. And left in May 1983 and set up Amiga with Pauline Jones, an accounts and legal expert, in sales. Both women are still part of the Amiga team.

*Entrepreneur* (June 1988)  
 Amiga's success was due to the fact that  
 it was the only company that was  
 selling software directly to the public.

In June, he started a computer shop. Amiga have two computer shops, one in Dartford and one in Horley at which they sell a lot of bits and pieces apart from Amiga software. The shops are not profitable but And uses them to gauge the market. For example, he is currently negotiating the production of entering the information market and uses the feedback from customers as a guide to the future.

They finally set up business premises in the first week of July. The Commodore store had proved such a success that, says And, "The money we took there paid for our furniture and everything else."

So, who were Amiga's early programmers? They consisted of And's and Roger's children and an assortment of onlookers from the bedding department, whom And and Roger trained as programmers. They now have a team of 25 programmers; although they work in house they are all employed on a freelance basis. Referring to their first game, *Cavern Fights*, a scramble type game on the VIC 20, And says: "The hardest part was trying to fit it into 32k of memory". As to retail production, "Like every software house in the country at the time, we typed our own labels and did a





air (and packaging from home).

The company soon paid off very well. Among them have a string of successes behind them, probably the most famous being their flight simulator. But Axford clearly understands how much harder it is becoming to churn out one hit game after another.

His belief is that steps must be taken to succeed, or at least keep up with American imports, particularly those marketed by the company with the hidden touch, US Gold. "Lined we might survive", is his ringing call to action.

**"No software house in this country is big enough to compete with the Americans."**

He has founded a very loose federation with foreign companies from Germany, France, Spain, Canada, Belgium and Holland to market each other's programs. For example, Map-Mon, their current big seller, is a Canadian game. Says Axford: "No software house in this country is big enough to fight the Americans at their own game. An American software house usually produces 3-4 programs a year, funded by \$25,000 a line. I doubt whether any software house in this country can spend that on one program. US Gold is pushing out software houses. Their games are very good."

Axford is distancing from the games market. And is very worried about the tough competition. "It is very difficult for us to compete on a shelf life of 3-4 weeks". He thinks that a software company can only compete in the games

market with an infinite amount of games but no British company has such resources. Axford are now publishing other companies' games. Apart from their own with 4 foreign magazines as mentioned above, there quite machine utility, for example, a from Rompage and is the first piece of homegrown software to be published over here.

Axford were one of the first companies to enter the C64 market. But, and Gupta are very opinionated about the C64. "I can't see it going very long unless the low price brings it up again", he blames Commodore. And, in contrast with a lot of software companies, approached Commodore when the C64 first appeared. But Commodore was it was lost out the C64. They wanted that all programs must be made through them and that they would receive a percentage of the royalties. The result: "There was no software available, thanks to Commodore's marketing".

Once C64 were generally available, Axford were one of the first companies to develop their own software. They were, also, the only company to turbo their C64 programs. Their games have sold well. The news from our review team is that Axford is one of the few companies to produce high quality software for the C64 - for instance, 512K Commander, Atopredes and the Incredible Flight Path 717 put our C64 software specialist. And is certainly distinguished by the general quality of C64 software. Referring to his other role, he says "When you are a shopkeeper, it breaks your heart when

children return software and say it's rubbish".

And says they will produce 3 or 4 more games this year for the machine. What else have they got up their sleeves, then?

Two new titles were demonstrated at the IFT Show - 1 is a Master and Super Master. Bruce Axford is a crystal recorder who has mainly offers a lot of potential for the non-games market. Says Axford Gupta: "The audio Axford are fascinated - it can help them learn to speak English".

And there is certainly lots of interest from the educational sector. Because of its visual recognition facilities, for example, handicapped people may use it to play and give commands to adventure games.

Super Sprint is a two-part book for creating a line graphic. It is also can be created by one of our artists from drawings clipped in the past. One review both these titles in a separate article.

And is also entering the educational software market. He is a teacher and has helped convince him that there is a greater need for good, aesthetically-pleased software.

Axford's introductory price of educational software is £9.95 and which he says "will cost for children from 8-12 years. It is the same program at different levels of English and marks. It provides value for money, is educational and entertaining. Kids will play it because they want to play it". This is the sort of positive approach needed to edge the sharks out of the educational market. Axford may be right, this product at a low price, so long and serious purpose. The 3 games and the booklet will sell for £9.95.

I touched the subject of piracy. And seems to have gone up trying to deter the software pirates. He has joined various groups such as BASF but has now stopped answering any inquiries about pirated versions of his games. Marked up beside his chair was a boxload of returned, pirated Axford games.

Axford has never pursued a direct publicity campaign. And seems anxious to maintain an image of an ordinary, medium-sized company. He believes that Axford should be judged by its products if people like them they'll buy them. They use no PR company and have done little PR work themselves, although Axford's assistant, Clara, will now be looking on this job.

**"There is not one game which we produce which I can actually play."**

Axford has, for a long time, been in the forefront of the Commodore games market. But, moving to British fields might be the right decision for the most likely conclusion, "There is not one game which we produce which I can actually play".



Anieng are out to prove that  
they're not just a games  
house. Allen Webb got a  
touch of the Leonardo's while  
Phil South found his voice  
[...we're still waiting for him  
in *Love 40*]

# ANIROG EXTRAS

## Super Sketch



Super Sketch consists of a drawing tablet and some software. Rather than operate on the pen-on-screen principle, the tablet uses a stylus on the end of a moveable arm. By means of some potentiometers, the software is able to establish the position of the stylus on the tablet. This position is then mirrored on the screen by a small cursor. So, by moving the stylus around a shape, the shape can be transferred to the screen. Connecting the tablet to one wire it just plugs into portcreek port!

While the original American version was on cassette, it will be on disc and cassette in the UK (at least the Anirog version). On loading, a title page is displayed and nudging a button you're in business. The tablet has five buttons at the top. The central button controls a clamp which is used to hold paper in place if you want to trace a shape. The two outermost buttons, labelled LEFT, are used to lift the pen from the paper so you can move about without drawing lines. LEFT also enables you to leave the menu. You can return to the main menu by pressing the RIGHT button. The button marked MIRROR is used to pass between options.

The system appears as normal multi-colour mode offering 160 by 200 resolution with up to four colours per character block. You can, within the colour constraints, set up to 16 colours in your picture. The software is completely menu driven with four menus available.

The main menu provides the main system options such as colour change, fill, erase, zoom, undo and page swap (two drawing pages are available). From this menu you have access to the

other menus. Both fill patterns and brushstrokes are user definable. Whilst 16 pre-defined shapes are available, you can create your own. This means that you can design a four colour tartan design and then print a shape with this design. These options offer a huge range of drawings and colour tones.

The normal drawing options of lines, rays, boxes, circles, ellipses, copy and a range of erasing options are available offering excellent facilities. There is a zoom window available which allows you to study both intricate work. A window option allows you to work on any specified area of screen.

If there are any omissions, they are a window dump and information on how to use the pictures in your own programs. Anirog advise me that they will provide both in the final version.

Overall this system operates faultlessly. The accuracy of the stylus is good and this is enhanced by the fact that there is almost a one to one size ratio between the tablet and the screen. The software was a joy to use being both simple and flexible. The simplicity of the software is exemplified by the fact that my ten year old daughter got to grips with the program. The package comes with a series of line drawings which can be traced and coloured. At the price, the system is a nice last value and great fun.

## Voice Master

The instructions suggest that you might be able to "... have your computer talking back to you in your own voice, allow your computer to understand what you say, and write music and play an instrument just by humming..." On realty!

What you get is the base unit, a small brushed aluminium box, housing comprising a head mike and waveform onto analogue combos, and the disc with all the programs on it. The box contains a set of low quality sound sampling discs, digitally recording the sounds you speak into the mike, and regurgitating the speech over the loudspeakers of your TV. An ideal popular example of the results you can get with this sort of system is the "Ghostbusters" and "The Armed and"

Iron Chestbusters by Activision. Once you have disposed your words, the results can be saved and played back on any PC, without the hardware. Good news for games programmers!



The voice recognition part of the package samples a word over and over, so that the word can be remembered, recognised and word upon, even if you got a cold. You have to speak clearly though, it's no use saying "Hillbillies" if you want your hardware to rigid fire!

Finally, the voice keeps speech going you the ability to turn off whole a tone into the mike, and have the computer print it out on a musical staff. Whether this last feature works or not, I don't have the slightest idea, as the review copy of the disc I was sent didn't have the program on it. Shame, because this was one of the more exciting features of the advertising!

All in all, this is a very tidy and up-to-date piece of kit. The sampling of voice cannot be any better quality, without additional hardware to govern hi-quality output. As a piece of program development hardware, computer human interface, up-to-date games design hardware, it is an essential buy for 1989. As it should be without one.

Super Sketch - £49.95 (cassette)  
£151.95 (disc)  
£39.95

Voice Master  
Anirog Software Ltd.,  
28 West Hill,  
Oxford,  
OX4 2JL,  
OX4 2JL



# SOFTWARE SPOTLIGHT

Our spotlight falls on another selection of new games and utilities.

**Poker**  
♦ ♦ ♦  
Duckworth  
\$7.95  
CIBS 14

MTING DOWN AT THE POKER TABLE with such a bunch of smooth operators and wives of the Fies of Matt Collins, Jack like and Billy the Kid is bound to be an education. Here's more so if your education is as rusty looking in the mountains of card smoo, as mine is. I follow a to say that I now have a pretty clear idea as to precisely what you're supposed to do with the first cards you are dealt. Would you believe it, I even won a hand out bluffing some of the biggest bluffers in the world! You start off the game with a thousand quid in your pocket. With a bit of luck you could turn a profit as the computer plays every hand except your own... unless, of course, you want a bit of excitement which it will give without, I may say, cheating. Well it is all bound to give you advice whenever you want it. Most of the time she will probably advise to throw it all in. Perhaps that's because the art is thick with running and there are more than a few lingers in acting on the trigger of a gun. As a spectacle this is a pretty impressive piece of software although it does teach the beginner the particulars of the game.

R.M.

**Rail Boss**  
♦ ♦ ♦  
Customsoft  
\$11.99  
CIBS 14 + 1541 1984 soft

IN THIS BUSINESS DISC BASED GAME you are boss of a small-time railroad in the Wild West. If you build a line through Indian and Indian country from Home City to the main line at Junction City you hit the big time and win the game. It loaded without trouble and the 30 page manual is easy to follow. The authors aimed both for a challenging game with pleasing graphics and a realistic but not too detailed simulation. Did they succeed?

Each turn represents a day. You may sell shares, buy a loco, hire or fire staff, lay the track and so on. You get reports on how you're doing and what's happening in the locality. Unfortunately, the pace is slow because you walk through tediously repeated menus and information screens.

I completed a game in two sessions (there is a 'save' feature). The only challenge was to plod on; I don't fancy having another go. Once you get some track working there is little risk of bankruptcy but you can't make a fortune either because the robbers and greedy shareholders are programmed to limit your cash below \$1000. The program only allows one work train at a time so you can't even plough profits into faster construction.

The graphics are fair but the presentation generally looks gaudy. There is no sound until you start when you are treated to a little tune. The idea behind the game is good but you don't control enough decisions for the program to be very interesting as a simulation or challenging as a game. It's about the railroad doesn't do over the goods.

S.J.J.

**Scavenger Special**  
♦ ♦ ♦  
Baker  
\$6.95 (monthly)  
CIBS 14 + 1541 1984

I RECKON GREEN-PACT SUPPORTERS are going to love the new game from Baker. But, even if you aren't a Greenpeace supporter, you can still appreciate it.



You control Ratsky, Ratsky who is a destructive beachcomber. What he wants to want in life is to kill off a few of the mean 'Polystyrene' by throwing radioactive waste at them. Getting the seaweed is the hard part.

Ratsky must rush about the beach collecting clumps of the sea weed while avoiding the strange variety of mutants which inhabit the place. These creatures range from guards to jellyfish. Guards march up and down the beach and will shoot anyone who gets in the way. Jellyfish will sting you to death. Crabs just nip your toe and make you jump about the place, usually into a guard or jellyfish. 'Seagulls' have also mutated into giant birds which try to carry you away and clamp over to eat you.

Once you have collected ten clumps of seaweed, or more, you can exit the beach and head for the town Downing Nuts where the real 'Polystyrene' live. They will appear at windows and you must hit them at least five times to kill them. Those 'Polystyrene' don't had back from the people who are running your country you know.

The graphics are great and often very funny. The sound effects are varied and the sound of the sea is very realistic. The game also includes the note 'I do like to be inside the guards'. I reckon it should have been called 'I don't like to be inside the guards' for the game!

Overall this is an addictive, good humoured and sometimes funny game. Fans of fastest games will love it - I do.

P.R.R.



### Break Fever

\*\*\*\*\*  
Interceptor Software  
\$7.99 (quarter)  
C184141 - joystick

loaded the title screen appears and the great sound track begins (the game's first point). A swirling message thanks people who have helped with the game and also takes a stab at its poor environment. Pressing two begins the game.

First of all you can select your team's colours, a nice touch but I always used the standard default colours. Once this is done you can try your hand at the first dance. A graphical stage appears with a large backdrop covered in what seemed to me, meaningless graphics. Your break dancer appears in the center of the stage.

There are seven different dance movements, some of which are more

complex than others. They are, Turtle, Discovery lock, Space Shuttle (which was mentioned in the title screen message as a 'lead up to unity movement') although I have no idea what, Headspin, Flip, Backspin and Barspin.

The game has no scoring system but springs are given. They range from, 'You're bad news man' which is the lowest, right up to the top which is 'Awesome'. The graphics are quite good and the sound track is wonderful. However, I found the game pretty dull and not very playable at all. Interceptor have released some excellent titles in the past but this is not one of them.

FREE



### Rocked Rager

\*\*\*\*\*  
Allegre  
\$7.95  
C184141 - joystick

Having got that off my chest, I have to say that Rocked Rager is by far the best game of its type that I have yet seen. It is also a better most others. The playing area is one continuous scrolling screen, so that the player is able to view the entire game without first having to clear any screen.

The actual game play takes place in a window which occupies the upper half of the screen, the remainder being used to display your score, lives and level. This adds to the difficulty factor as, when you jump, you lose sight of the ground as the screen scrolls with you thus making it impossible to be sure of where or on what you will land.

The game starts above ground but, as your score over high mountains with the

aid of your jet pack, you soon spy a deep hole, through which lies a vast cavern full of the usual paraphernalia of electronic barriers, invulnerable platforms, enemies and monsters of the most unusual kind. Fortunately, very little of the scenery, other than the mountains, is fatal to our fearless friend so that exploration is rather less dull as it usually is the case.

The motive behind all this activity is the need to find and remove 999 lost crystals to enable you to rebuild your stranded space ship and escape the planet.

These games leave me on a bit of a high like them - so many of you read - then check this one out. It is, as I say, the best I've seen.

D.J.T.

IF THERE WAS NOTABLE FOR NOTHING, this it was definitely the year of the Platform and Looter game. A combination of the original Kong theme seemed to emerge every five days and I for one maintained a fervent hope that the 30th year would entail some originality in software writers. Allegre didn't seem to share my hopes and have released yet another of the dated things.

## Headache

\*\*\*  
 Softart  
 £14.95 (street)  
 £10.95

THIS IS A NEW GAME FROM the low-priced range of programs by Telestar's software house.

Your task is to keep your fingers impaled to the brain inside a graphics head. Out to keep fed and sane. Think. Don't worry though because you are equipped with an antenna to dig them out. Also out to annoy you is "Bob".

## SUPER BASIC for the Commodore 64

\*\*\*  
 Computer Software  
 £8.95  
 £5.95

TO DATE I'VE WON 50, 15,000 BASIC for the 64. This package is the cheapest of the bunch and, as such, proves an interesting exception to the rule that "you get what you pay for".

The basic modes in the

work an excellent PAGE removes spaces and TABs, giving you more free space. PEEK AND PULL are available so permit the copying of vectors etc. PEEK is provided to let you lose a BATTLE from the start, but I consider it a programming failure if it must be said.

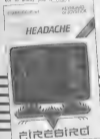
The graphics commands are versatile but a little rudimentary. Bit-mapped graphics at both high resolution and multi-colour modes are supported with full control of plot colours. The actual drawing commands are thus an

## Karna

\*\*\*  
 Commodore  
 £10.95  
 £8.95 (street)

REMEMBER KARNA? HE WAS the ancient Greek who tried to fly too close to the sun with his wings of wax and feathers, with predictable results. Well, in this quasi game, you have to help poor little mortified fellow Dardanus who has gotten the sun's flames the wrong

Long your protest, help him to fly over the bird and swimmers of ancient Greece, avoiding volcanoes, hills, and rocks.



larger. If he gets to his brain, a headache sets in and you win a big 100000 for the person with all the going on in his head.

The screen comprises an outer of a head with a series of labels and pointers inside. The labels caused a few problems to create as text is not as wide as they are. The graphics on the whole are well defined and nicely coloured. Music and effects are good and even the music, however, leaves a bit to be desired. There is a two player option and you can toggle play on one of eight men. Each level has a new set of labels and different things to avoid and eat.

Overall this is a well presented game and is well worth the cheap asking price. **P.B.B.**

space 4K between the ROMs and, by using the RAM behind the ROMs for the graphics screen, make very use of the area for BASIC. I agree that this approach is being variable and extremely desirable in common with the other packages available, the extra commands cover the area of graphics, sprites, sound and so on. A set of all the available commands (all of them) means that they aren't partly, any exceptions but do fill many gaps. Structural programming is completely unrepresented as if you want procedures, it's THEN, JUMP or REPEAT. LATCH, look elsewhere.

The utilities section covers most areas for program editing. There are ALTO, BIN/IN, PAGE and DELETE. All

the ground with only procedures and basic. Further PEEK or CIRCLE are available.

Almost all commands a command are given for sprites. You can turn them on or off, specify run-to-out or to-in, expand them, move them, change the colour and specify priorities. The only missing one is the destruction of collisions. The sound commands are pretty extensive covering most of the basic. Likewise it's a pity that cross modulation of notes is not supported.

On the whole this is an excellent package which is very good value for money. The omission in some commands isn't surprising when you consider that the package only occupies 4K.

A.W.

birds, which try to force you downwards, giant bees (which sting), and a small, round, winged form (which can just sting). And the burning sun which tries to steam you upwards into its fiery embrace - and destroy it.

You start out with two lives and can choose from two levels of play. Your energy can be replenished by landing on top of certain birds, along. The lower you fly, the more points you score - but watch out for the black on that is one you everywhere, it certainly isn't what!

The opening sequence has a nice piece of music - but why does it stay for too long? The sprites are rather well done and the sound is good. The birds don't enjoy you for an hour or two.

M.J.N.

# SOFTWARE SPOTLIGHT



**THANK YOU, ACTION! YOU'VE** reassured me that a lot of those damn plovers on Invaderz machines in the 80s and 90s just were really looking at a boring program for something worthwhile in Pacifinder. Make no mistake though, this game is to spare invaders what *Assault* rockets are to warp drive. It's a sort of arcade adventure with the emphasis definitely on arcade.

The player controls a lone spaceship called a 'leaper', a little mutant with a

thing for radioactive holidays. Leaper moves forward only on a vertical scrolling screen but does, he moves forward whirling from side to side, gliding up and down completely with his own shadow giving the player an excellent perspective on all the action. There are obstacles to jump, riding alone and stationary defenses to be shot and radiation pools to be torn asunder to reduce your radioactivity which naturally enough eventually kills you. The object is to wander through the scenery picking up the artifacts and depositing them at bases already simple beavers will build the leaper, out-futuristic things like an extra life every 2000 points and not at some ludicrously impossible target. As more artifacts are

found, more of the maze map is revealed at the end of each sector, thereby dodging yet more traps. Useful items or equipment also have to be updated and can be selected from the menu which appears after each sector. There are hundreds of things to shoot but if you ignore the tactical choices open, you won't last for long. The graphics are smooth and clear throughout and, while the sounds aren't stunning, they've got that pulsating quality that made the original Invaderz great. Actioncom just don't seem to produce bad games and this masterpiece is one of the most addictive I've seen in ages. Manage your monitor for it.

**E.M.**



**MANY BEGINNERS BEMOAN THE** lack of structure of Commodore BASIC and buy add-ons such as Intertec's BASIC to improve matters. PASCAL is a highly structured language which will appeal to those who want to write concise and

multiple programs. Like the UCSD system, this is a compiler which acts on a source code stored on disk. The source code is written using the 64's own editor and therefore has line numbers in features not seen in normal PASCAL. The compiled code is then transferred to disc and can be loaded by use of a loader program.

The system includes the usual PASCAL commands but also contains a number of extensions such as POKE, PEKE and program comments. A STX command is available as a link to machine code and

two programs can be operated simultaneously using interrupts. The seventy page manual is reasonable albeit rather staid in places. However, will require use of the standard text books to learn the language.

Once PASCAL 64 is compiled, it operates at a decent speed, although I couldn't confirm the claimed 30 to 60 fold improvement over BASIC. Overall an excellent package which, at a reasonable price, gives a good introduction to an exciting language.

**A.W.**

## Jack Attack

\*\*\*  
Commodore  
17600  
1984-85

JACK'S A STAMPEDE! HIS FEET and a rain of logs to watch out for rotate heads, stick around and be regarded as your pet because this is not quite the sort of it first looks. Hint—and the instructions because

there's more to Jack than meets the eye.

On each level of play out of a total of 64, there's a different arrangement of blocks on the screen which Jack can manoeuvre around in one push-one pull-you-fashion. Plus the building game right and you can squish the rotating heads which drop from the sky

and become around more easily waiting in pressure on Jack. Of course there are many other ways to do a lot of something such as by Jack dropping on top of a head from a well-timed jump or kicking off the top of a block. But be careful, Jack can only jump three blocks high and some screens have water and lava

can't swim. Other screens have strategically placed platforms for which there are bonus scores. Further bonuses are awarded for doing all the squashing you need to before the sand of time runs out.

Overall, not a bad combination and combination of various tried and tested themes.

E.M.



## Pengo

\*\*\*  
At Gold  
(800) ( cassette) £12.95 (flo)  
1984-85

THE BEST ICE WITH A GOLDEN TASTE! Not yet such high standards of power-ups in the past that anything as thin as the best standard computer. And there's no doubt that this is the best the best a thought it is over the best



better than the average offering.

So what do we have here? A two part, two screen jungle adventure no less. First of all you have to climb a jungle mountain avoiding the falling opponents through monkey mazes populated by a family of giggling monkeys and on up to Compo's last. Lives are lost but just being plain slow, getting obliterated by a running coconut and falling into the river. Reaching Compo's last automatically



takes you on to the second screen where you have to cross a fast flowing river by leaping a mile on the pappas, my pads passing him and raging them on the other side. Shades of the previous stages here we think. But haven't around. Haven't merely takes you back to the first screen although it's not quite so easy this time around. More impressive numbers no doubt?

E.M.

## Pandora's Box

\*\*\*  
Commodore  
1200  
1984-85

CHIEF! IS THIS THE BEST THE MAIN! Because this product has to ever existed! Truly this particular Pandora's Box is truly a blessing in any delight. In your home, it looks as old as the B. is. The

best copyright is a dead give-away.

But it is, on with the show. So does Pandora's Box contain? Naughty Pandora has pulled the lid off her box and is letting all the nasty bugs escape. The bugs change colour all the time and the mix may be the last step! (well not escaping is blowing them on to the side of the box, which is the same colour as they are but only when they have reached full size. Good old! It gets even better. If Pandora

gets ten she automatically moves to the clear table where you have to help her drink the right mixture.

There are eight levels in the game and you progress after the time period for each run-out. The game only moves when 25 bugs have escaped as Pandora has run out of material there to drink. But then I almost forget, there's always the power switch.

E.M.

## Pencilator

\*\*\*  
McIntosh Home  
1700  
1984-85

BEST GAME CLOSELY RESEMBLES 'Number 1' which was one of the best selling games available then 'one up on which you controlled a small space ship through patterns of varying complexity, while being shot at

by insects launched from beneath you. The object of the game was to destroy a missile dump, or something, on the last screen. You had a life if you hit a missile or if you hit anything. That, basically, was 'Number 1' and that, basically, is Pencilator except that in the original, if any memory serves me right, you had to be hit just one step by the obscure process of bombing fuel

dumps. The strange tactic has been abandoned by McInchome House: you never run out of fuel or weapons in Pencilator, only lives. And even then there is a simulator mode which gives unlimited lives but no score, unfortunately.

And that you have a, but not one very nice touch. As matter how simple all the program you become you need never get bored with it as

McInchome House have included an edit feature with which you can redesign the entire game including the number and position of lives, scores, tables and the components of the levels. By simply following the on-screen prompts. That feature, I feel, is the thingy part of what is, after all, a state of a successful game.

E.M.

**Mr. Freeze**  
 ■  
 Bubble Bus Software  
 £14.95  
 CIBS 64 • joystick, optional

THIS PACKAGE FROM BUBBLE BUS is professionally produced. It loaded first time everywhere, featured music played on an FM, had a game and continue feature and an infinite number of random hints for keyboard control.

Unfortunately, what it lacked was that spark of originality which sets the best apart from the rest. The game turned out to be yet another fairly ordinary platformer, laden, as, for objects combination.

Yet in a freeze, your job as Mr. Freeze is to devise six compartments made up of its different sections of varying areas of difficulty, playable in any order. Rendering your good work is a horde of frozen intruders like fish, chicken legs, custard pies and so on as well as some cool customers in the shape of garden robots.

Quite an original plot but the alternative Bubble the mind. Mr. Freeze had to clean your eyes, Henry. It is no clear the same in the water. Just check at all these items in the offing have.

Apart from the background music, sounds were of the average variety but graphics, while hardly innovative, were well executed with a smooth changeover as Mr. Freeze walked from screen to screen. High resolution added from game to game. Yet in the comp had all the features of better games produced these days.

After a few plays it left me cold (no pun intended) but the price of the package has to be borne in mind. That said the competition in this price sector is becoming keen and with the steadily raised completely different Chiller around, I know where my money will go. If you don't have a particular/old-fashioned type game, Mr. Freeze is I'll be a gap in my software library without seeming foolish. But was so many similar and better games around, paying a pound or two more might be a better option.

R.M.

# SOFTWARE SPOTLIGHT



**Aqua Racer**  
 ■  
 Bubble Bus Software  
 £8.95  
 CIBS 64 • joystick

IF YOU ENJOY THE EXCITEMENT of power boating, this game is for you. The player controls his boat, complete with outboard and wake from the bow, moving the joystick around different courses of increasing difficulty. Forward is used for acceleration while pressing the fire button will change gear. The power boat is shown inside screen and the object is to complete each course within a given time without going outside the marker lines or colliding with other boats, which you inevitably have to overtake. The course and background scenery scrolls left and right with your direction of travel and a laser graphics are

well produced right down to a little chug when low fuel caution at the start of each race.

There are 26 ascending levels of difficulty and should the qualifying round give a test. Happily, there is a practice mode that avoids these headaches in the other boats who also get 100% to give the way. Any difficulty level can be selected for practice. Plus the horizon will be faced can be previewed.

The menu screen also shows high scores, keeping a record of three. An option of up to four players is provided although this is limited to each player having one turn and seeing how far he can

progress.

A beautiful tone accompanies the selection menu but otherwise effects are of the whole scene, varying porting engines, gear changes and collisions. Captions are all well produced with good contrast on both the information and instruction side of things.

My only qualification would be the lack of visual variety on each ascending level. All in all though, it's a goodie.

R.M.



A.P. and D.J.

Stephenson sort out  
your data problems.

WORKING DATA INTO SOME level of order involves an exceptional amount of processing time, most of which is spent comparing relative magnitudes. Although each individual comparison can be carried out in a few milliseconds using BASIC, the time taken for a complete numerical or alphabetical sort of, say, 1000 data items can be massive, rather than seconds. Even one minute is a long time to wait just watching a blank screen. Of course there are efficient and not so efficient BASIC programs but even the best of them are often unacceptably slow. The answer, of course, is to use something (and subroutines) which, in general, have the effect of changing minutes to seconds. Before attempting to describe them, we take a brief look at some of the hardware obstacles involved.

The execution speed of machine code routines. Powerless musing in underlying design, most algorithms are limited by the hardware in general and the microprocessor, in particular. It is customary to measure the speed of a computer in terms of mips which is an abbreviation for millions of instructions per second. The 68000 used in the Commodore 64 and the 68010 in the Commodore 64 are the 68010 in terms of mips — around 0.5 mips. In contrast, some of the mainframe giants have a speed of about 100 mips and the low bitb generators (readers are predicted to approach 1000 mips).

So, we can see that our Commodore machines, in common with most other general use microcomputers, make exceptional demands on software techniques to overcome hardware deficiencies. Perhaps we should point out that one mips means one million machine code

instructions (from BASIC statements) per second. When we consider that some BASIC statements require over 10 machine code instructions, it is clear that the situation is even worse. This means that BASIC must be the first casualty in the war against sluggishness, and its place taken by machine code.

As we have seen, sorting data into numerical or alphabetical order is an extremely slow process and programs which frequently have to sort data, such as filing systems and databases, require machine

code therapy to remain active.

### Integers and integer array storage

We have stressed the importance of machine code sorting but, in most cases, other parts of the program may be written in BASIC. We must, therefore, write the subroutines with this in mind. For example, machine code subroutines will be called from BASIC and then returned to BASIC. The necessary parameters,

are stored and arranged by the BASIC interpreter. Although, in most cases, data will be held in numerical or string arrays, we ought to start from the bottom and consider how integers are stored in the Commodore 64.

A simple integer can represent signed whole numbers between -32768 and 32767. This requires 16 bits, 16 of them for magnitude and one for the sign. The two bytes necessary for each integer are stored as shown in Figure 5.1.



Figure 5.1 How the BASIC interpreter stores integers in an array



Figure 5.2 The components of the array header

such as the number of data items and where they are in the memory map, must be passed over to the subroutines from BASIC. This means that we must have detailed knowledge of the way numbers and strings

each integer of the array is stored in sequence of addresses in the array. Pughley's first, low byte around the starting address of each integer is therefore two ahead of the previous one.

## The array header

In addition to the block of integer data, the BASIC interpreter requires some identifying "markers" to be stored at the beginning of the block. After all, the array is given a name chosen by the programmer, for example *AGE*. There may be more than one array, so the array name, in the case, *AGE*, must be stored. The interpreter will also need

to know what dimensions it has. For example, is it DIM AGE(5) or DIM AGE(0,1). The information and some more bits and pieces are stored at the beginning of the block of integers named the array header. The details are shown in Figure 3.2.

The details of the array header are as follows:  
 Lines 2 and 2  
 There are reserved for the two characters allowed for the array

name. Byte 1 will contain the ASCII code of the first character and byte 2 the ASCII code of the second character +50. But an array name can consist of only one character, in which case, byte 2 contains only +50. The constant 50 is decimal is, of course, 1E in decimal and ensures that the index set to 1 has later identification purposes.

For example, if the array was

named *AGE*, byte 1 would have 50 (the ASCII code for 'A') and byte 2 would have 55 (the ASCII code for 'G') because there is no second character.

Lines 3 and 4

These represent an address pointer to the start of the next array or another array processing. The next address of the present array is the constant of bytes 3 and 4 will produce the starting address of

Program Listing 3

```

10 ' BUBBLE SORT
20 ' ARRAY OF SIGNED INTEGERS
30 NUMBER = #0
40 CYCLE = #0
50 POINTER1 = #5
60 POINTER2 = #99
70 FLAG = #0
80 #=40960
90 DEC
100 LDA NUMBER
110 SBC #1
120 STA NUMBER
130 BCS OUTFLOW
140 DEC NUMBER+1
150 OUTFLOW:
160 LDA #0
170 AND #0
180 STA POINTER2
190 LDA #0
200 AND #0
210 STA POINTER2+1
220 LDA #0
230 STA FLAG
240 STA CYCLE
250 STA CYCLE+1
260 INFLOW:
270 STA POINTER1+1
280 LDA POINTER2
290 STA POINTER1
300 CLC
310 ADC #2
320 STA POINTER2
330 BCC SKIP
340 INC POINTER2+1
350 SKIP:
360 DEC
370 LDA (POINTER2),Y
380 INC (POINTER1),Y
390 BNE INFLOW
400 LDA (POINTER1),Y
410 SBC (POINTER1),Y
420 BVC NOOVERFLOW
430 LDA #0
440 NOOVERFLOW:
450 BPL NOOP
460 INC
470 SWAP:
480 LDA (POINTER2),Y
490 LDA (POINTER1),Y
500 STA (POINTER1),Y
510 LDA (POINTER2),Y
520 DEC
530 BPL SWAP
540 INC CYCLE
550 AND CYCLE+1
560 BCC SKIP2
570 INC CYCLE+1
580 SKIP2:
590 BNE INFLOW
600 INC INFLOW
610 LDA CYCLE+1
620 CMP NUMBER+1
630 BNE INFLOW
640 LDA FLAG
650 BCS FLAGCLEAR
660 LDA NUMBER
670 DEC #1
680 STA NUMBER
690 BCS TO TOP
700 DEC NUMBER+1
710 LDA NUMBER
720 BNE INFLOW
730 SKIP3:
740 DEC
750 LDA (POINTER2),Y
760 FLAGCLEAR:
770 BNE
780 BNE
790 BNE
800 BNE
810 BNE
820 BNE
830 BNE
840 BNE
850 BNE
860 BNE
870 BNE
880 BNE
890 BNE
900 BNE
910 BNE
920 BNE
930 BNE
940 BNE
950 BNE
960 BNE
970 BNE
980 BNE
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1120 BNE
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10000 BNE

```

the next array — this can often be useful information.

#### Byte 5

This contains the number of dimensions in the array. For example, DIM A%(100,1) represents a two-dimensional array, so byte 5 would contain binary 00 001. In fact, figure 9.1 assumes this.

#### Bytes 6 and 7

These two bytes hold the array size.

#### Bytes 8 onwards

The array header finishes at byte 7 and the actual two-byte integers are stored sequentially following on from the end of the header. The first pair is element 0, the next pair element 1, and so on till the end of the block. In most cases it is advisable to leave the space for element 0 empty and reserved at element 1. If we do this, we know, from previous work, that initializing the start address of the array by two gives the address of the first array integer. On the other hand, if we do use the element 0 position, we increment by one given. Subsequent increments of two will find us through the remaining integer pairs.

### Supplying the parameters from BASIC

Now that we know how integers and their array headers are coded, we can work out what form of BASIC assignments must be written before calling on a machine code program for processing an array. For example:

#### Parameter passing

```
100 DIM A%(100)/256
110 LET A%=(RND*(256)
120 FOR N=1 TO 100
130 A%(N)=INT(RND*
140 256)/256
150 NEXT N
```

With a large number of integers in the array and a BASIC integer variable, this must be split into two components: bytes 128/129 for the high byte and 126, for the low byte. Note that here 100 (the 100% is obtained by dividing by 256, since 1% is stored in integer form) there was no need to use the INT function. The low byte is obtained from the same value, using the expression in line 110. The two bytes are then stored in addresses 251 and 252 using

### Program Listing 2

```
10 REM SORTING BY C INTEGER DATA SORTING
20 REM GENERATE RANDOM INTEGER ARRAY
30 PRINT CHR$(147)
40 INPUT SORT: LOW HIGH: INTEGER%100
50 REM FILL AND DISPLAY RANDOM ARRAY
60 DIM A%(255)
70 FOR N=1 TO 64
80 A%(N)=INT(128*(RND*256))
90 A%(N)=A%(N)+128*(N)
100 PRINT A%(N)
110 NEXT
120 PRINT
130 PRINT "SORTING"
140 PRINT
150 REM SET UP NUMBER PARAMETER
160 H%=H%/256
170 L%=L%-256*(H%/256)
180 REM PASS NUMBER PARAMETER
190 PHE=256/L%
200 POF=256/H%
210 REM CALL BY C SORT ROUTINE
220 TR="00000000"
230 BY=49152
240 TR=TR/60+0.5
250 REM DISPLAY SORTED ARRAY
260 FOR N=1 TO 64
270 PRINT A%(N)
280 NEXT
290 PRINT:PRINT "SORTED"
300 IN$=CHR$(147)
310 GOTO 40
```

POKE The machine code routine is assumed to start at 40,000 which is 49152 decimal.

### The bubble sort

Because of the importance of data sorting, many computer users concentrated upon the problem, and a few cleverer number of different algorithms have evolved. A simple and well-known algorithm, the bubble sort, the details have been well documented but we will give a brief outline.

Two loops are involved. The outer loop compares, and if necessary, swaps adjacent items. The inner loop in the array always 'bubbles' down to the bottom — hence the name. It is no longer necessary to involve this integer, so the outer loop count is reduced by

### Program Listing 3

```
00000 26 45 18 17 05 00 18 04
00004 02 16 1C 15 05 24 49 09
00008 05 09 05 11 07 06 05 04
00012 04 00 07 0F 05 10 05 00
00016 07 05 00 10 05 09 05 07
00020 10 09 00 07 04 90 10 06
00024 04 01 01 10 01 07 01 07
00028 00 01 11 01 07 01 02 07
00032 00 10 10 10 00 01 01 07
00036 06 05 09 01 07 00 01 00
00040 10 10 11 10 00 00 07 06
00044 05 05 10 05 10 01 05
00048 05 15 1C 00 00 05 0F 10
00052 11 07 00 00 07 03 05 00
00056 04 04 10 1C 05 10 00 03
00060 00 1C 00 00 00 00
```

Program 9.1 The jump version of Program 9.1

one and the other loop is again entered. On subsequent loop tries, the next largest integer bubbles down to the last out one position, and so on, until the entire array is sorted. Since a large number of comparisons are necessary, the execution speed, in BASIC, is very slow. In machine code, however, the speed is increased to an acceptable level.

The use of a swap flag can speed up the execution of a bubble sort, particularly if the array is already partly ordered. In fact, an array is seldom completely disordered. The swap flag is reset to zero at the start of the outer loop and, if a swap is necessary, the flag is set to 1. If a complete cycle has occurred and the flag remains clear, it indicates that a swap was unnecessary and the array must be completely

sorted. As soon as this condition exists, no further loop cycles are required and the program can be terminated. Strictly speaking, the inclusion of the swap flag changes the pure bubble sort into a hybrid bubble exchange sort.

### A machine code bubble sort

Program 9.1 is a listing of a bubble sort using the swap flag.

It can be called from BASIC providing, of course, that the necessary parameters are sent.

### Analysis of Program 9.1

The program uses many of the techniques described in earlier parts of the series. You may find it necessary to refer back to the December issue of 'Your

Commodore' to remind yourself of indirect addressing.

Once this has been examined and assembled, it can be thoroughly tested out by means of Program 9.2 which is written in BASIC.

### Using Program 9.2

To test out the machine code, the program first uses low-level integers are to be sorted. The integers are obtained by means of the random number generator and placed in an array named *IN*. The raw data, in its unsorted form, is then displayed down the screen, in order to verify the use of the generating routine before the machine code gets to work. The parameters necessary for calling the machine code are the usual POKE statements described earlier. Before calling the subroutines with STX

#9556, the basic disk T&A is reset. On return from the machine code, the integers are then displayed in correct order followed by a run-up of the time taken to sort them. Note that the time taken to set up and display the random array often exceeds the sorting time, providing a good illustration of machine code speed. The clock, of course, measures only the sorting time. It is worth spending some time trying out the system with different numbers of integers. By doing this, you will discover how the number of integers is related to the sorting time. You will find that the relation is far from linear. In fact it is almost square law in terms and is the reason why the bubble sort is not popular if very large arrays are involved. However, sorting 500 integers only takes a few seconds.

#### Explanation of Program 9.1

Lines 35 to 39 Assign variables *i* names to obtain 2000 page locations. (2000 page is minimal for indirect addressing.) The number of integers in the array, together with some other parameters, is placed up when running Program 9.2 which passed to test out the machine code. This is described later. It is sufficient in the meantime to refer back to the first issue earlier, for example, POKE 361,100; the low byte enters hex address 361 and the high byte into the next location 362. Line 36 assigns the symbolic address NUMBER to 100. Thus the code is assembled starting at the address 361000.

Lines 95 to 140 Decrement the two byte integer 5(16000).

Lines 150 to 270 Move the address of the first element in the array in POKE#700 (2 more listed) to, picking up the starting address from location 362 and adding the offset 5. The addition of 5 ensures the points directly of the array, a not used.

Lines 270 to 300 Initialize the CYCLE counter and the swap FLAG.

Lines 300 to 380 Copy POINTED2 into 30000 (POINTER1).

Lines 380 to 440 Add 2 to POKE#700 and store the result in POINTER2 (two bytes). This register adding 2 is because the address of the next integer in the array is two bytes forward.

Line 440 A reload the Y index register to 1 for indirect indexed addressing.

Lines 450 to 490 Subtract the first integer from the second, low byte then high byte, keeping the most significant byte of the result in the accumulator (the holds the

all important sign bit). Indirect indexed addressing is used to pick up the integer bytes from memory. Remember that integers are stored with the high byte lowest in memory.

Line 420 Checks if the Y flag is set. If clear, it skips line 430.

Line 430 Assumes that the Y flag is set to increment the sign bit.

Line 440 Ties the sign of the accumulator contents and bypasses the swap loop if positive (preceding ones). This ensures that if both integers are the same, no swapping occurs.

Line 450 Prepares the Z register for swapping.

Line 460 Stores the Z register contents into IAC. In fact any non-zero number is sufficient to indicate a swap has taken place.

Lines 470 to 540 Handle the actual swapping of adjacent integers, starting with the high bytes. This is done if the sign bit is tested first. The Z register is used as a temporary storage cell because IAC is much faster than using a memory address. The store could have used bus PMA, takes 3 cycles.

Lines 550 to 570 Increment the CYCLE counter by 1.

Lines 580 to 620 Compare the low byte of CYCLE and NUMBER. If the result is non zero, a branch is made to the label PMA&1COP. If the result is zero, the program 'let's through' to compare the high byte at the same manner.

Lines 640 to 650 Checks if FLAG is clear and, if so, a branch down to 81AC0000 is made (only for test).

Lines 660 to 710 Decrement NUMBER (two bytes) to be taken into account.

Lines 720 to 790 Check if NUMBER has reached zero. The low byte is checked first, branching to OUTR1COP if not zero. If the low byte is zero, the high byte is similarly checked.



The Commodore C128 is the hottest Commodore news from the States at the moment and should be available in the UK from mid-summer. Barry Miles provides a sneak preview from his study of a prototype of the machine.

THE BURNING QUESTION ARISE in the Commodore fan's mind is "if not", especially in the wake of the withdrawal of the 500 and 280 machines, and the question mark over the Plus/4, following its recent price cut.

The C128 possesses an enlarged memory and can operate in a special emulation mode, thus making it compatible with existing Commodore 64 software. It can also run under CP/M which is a substantial advancement. This machine has an integral disc drive option and it should be possible to read CP/M discs which have been formatted on other makes of disc drives.

As far as looks go, the 128 is a very elegant machine. The main box which houses the CPU, is pleasantly angular in shape and has ample space to take the integral disc drive. The keyboard is detached and as a result which enables the user to place at a substantial distance away from the main unit (and mouse). The spacebars are identical to the 64's suggesting which 64 users will find attractive.

The function keys are at the top right-hand corner of the keyboard which means that, using them shifted, requires two hands. There are four cursor movement keys on the top row. On the top left of the keyboard are the ESCAPE, TAB, ALT/SHIFT and CAPS LOCK keys. An aid to those about the group of four are: F1/F2, PAGE FWD, 40/80 DISPLAY and NO MATHS.

The machine has been made more compatible by incorporating a series of emulators the main unit 640 which the keyboard will slip.

The sockets by the rear of the machine are the familiar old ones. The C128 uses standard "D-type" connectors for printers, unlike the Plus/4 and C16. Also, the cassette connector connects to a normal type of Commodore cassette unit other than the special one which is required for the C16 and Plus/4.

The integral disc drive unit which I examined was a "V" (supplied) version judging by the shape of the computer's



box, then I suppose it should be possible but there are no plans to include a hard disc version at the moment.

When using the disc drive in 40 mode, it operates at the cassette speed (541 speed) but it speeds up when in CP/M or C128 mode. One might have hoped that, when the machine is operating at 40, the spare 64K of RAM would be used as RAM-disk to speed up operation of programs which require considerable disk access. Unfortunately, as part of the 128's Commodore 64 compatibility, this facility has not been provided. Maybe it won't be long before people will devise methods of convincing the machine internally that it is operating as a C128 when this mode is operating as a C128 while disc access is taking place, only to switch back to 40 mode when mode is soon as the access is finished.

### In operation

On power-up you are automatically placed in the C128 mode. The power-up message says "128K bytes free which is quite impressive to old Commodore minds! If you have an integral disc drive I must think the machine is remarkably slow to load the first program on the disk.

In C128 mode the screen is a 40 column screen display. However, you can

change to the 80 column display simply by pressing the 40/80 key after turning the computer on. Once you have entered the 64 or CP/M mode, you must press the 40/80 button or turn the machine off and on again to return to C128 mode. To enter 64 mode, you either insert a cartridge containing 64 user code or enter 64004 and 661008. The CP/M mode cannot be entered from the 64 mode but, from C128 mode, you type 8004 CP/M and press RETURN. Alternatively, if you have a CP/M as disk disc in the disc drive, on power-up, CP/M will automatically be loaded.

In fact, one of the more exciting aspects of the C128 mode is that you can have 3 screens operating in 80 column mode, only one of which is visible at a time. Consequently, the computer can be working on one screen while showing another, and the user can switch between them rapidly. The connections on the machine permit you to use two monitor units. Consequently, one showing 40 columns and one 80 columns. It is therefore possible to have two different duplexes running by a single program.

### BASIC

The new computer contains the improvement in Commodore BASIC



which was apparent in the Plus II and II+. I used BASIC 7.0, which contains about 50 more commands than the 64's BASIC 7.0. The enhancements include a variety of "vector" type commands, string handling commands which make BASIC 7.0 a true 80-BASIC and substantial new graphics and sound commands.

Users will also be delighted to know that the C128 maintains the sprites and windows there is a lot more than that achieved with the 64.

A variety of structured programming commands like DO UNTIL, DO WHILE, LOOP UNTIL, LOOP WHILE, IF THEN ELSE have been included. Hopefully, the extremely structured programming language, COBOL, about to become available on the 64, will appear on the C128.

## Function keys

The function keys have useful defaults attached to them. These are as follows:

F1	Enter one of the graphics modes when the user supplies the number of graphics area
F2	Perform a CHOWN to start a fileload program stored in the low
F3	Turn a directory on the screen without disturbing the program in memory
F4	Clear the screen using the SCCLR command
F5	Put BASIC followed by entered control on the screen so that the user only needs to enter the program name to start the current program
F6	Access a ROM
F7	Run the program automatically
F8	The HELP key which highlights errors in any BASIC program when has been stopped for that error

So, the user needn't redefine the function keys to suit just their program.

## Other commands

BASIC includes DIR, BRAC to save BASIC programs, a WINDOW command, VERIFY with which you can check the program on the special disk drive against the program in memory.

Since the 128K memory is held in 2 banks, there is a BANK command which enables you to set the bank with which you are operating for GET, POINT and SET commands. An EXIT command allows you to get from a loop, it contains good notes as to how it should be using the stack.

## Graphics

The C128 uses two excellent graphics coprocessors. It can display 16 colours in eight levels of luminance, such as five different graphic modes, it has a sprites for screens are available in high resolution and multi-colour mode. Some commands include LOCATE, COLOR, DRAW, MOVE SHAPE, and a whole string of others such as FILL and BOX.

Scaling can be used in plotting on the

screens, either in high resolution or in low resolution mode. The scaling of bit maps on the high colour and high resolution modes can be changed with a SCAL command. Coordinates can then be scaled up to as high as 1023 on X and Y directions rather than the normal scale of 0 to 799 and 0 to 799 in high resolution, 0 to 127 and 0 to 127 in low resolution.

Sprites commands have been simplified: SHAPE, GSHAPE, MOVESHAPE, SPRITE, ANIMATE, SPRING, COLOR and COLOR ON are provided. Sprites can also be stored in a simple fast look-up in text strings.

Sprites can be traced in a number of ways, as with the 64, using a sprite color or using the foreground and background colors in a program.

You can draw a 24 by 24 pixel picture on the screen and then convert it into a sprite by using the SHAPE and MOVESHAPE commands. Sprites can be expanded vertically and horizontally and

moved together. Sprite collision has also been revised with the COLLID command.

It is also now possible to move up to 40 pre-defined sprites along a horizon line. This has many previously been possible by using COORD, as with other Sprites. BASIC extensions. You can also specify the spin many degrees, the sprite is in motion.

## Sound commands

New sound commands, previously accessible only by POKEs on the 64, include VOLUME, INVCORE, VCB, STAMP, PLAY and FILTER. STAMP changes the duration of notes when playing music, 11.74 defines musical instrument envelopes, and INVCORE defines the level of sound to play.

## 1571 Disk drive

The new 1571 disk drive for use with the C128 operates at 960 characters per second when used in 64 mode and can go up to 4,166 characters per second when it is operating in C128 or CP/M mode.

## Monitor

A monitor which has been devised for use with the C128, called RGB monitor, 80 characters by 25 rows on a 540 mm wide, in composite mode, 40 characters by 25 rows on a 640 mm wide. It should be noted that a television set or a 1281 or 1282 Commodore monitor can only function in 40-column mode with this computer.

Machine code programmers will be pleased to know that a machine code monitor of comparable quality to that in the Plus II has been included in the C128. Amazingly enough, the SAVE command will protect you to add one to the final address!

## Conclusion

With all the records, a preview of the C128, it is hard to say that the Commodore seems to have got it right this time. The inclusion of a faster disk drive motor and thousands of Commodore 64 programs to run on the new machine guarantees that the new unit will not be starved of software when the machine becomes available. Additionally, the new developments within the C128 mode are attractive enough to ensure that the machine has a lot to offer the user. The availability of a better disk drive is not to be ignored at, and reminds one of the major extensions of the 64. Of course, pricing will play a crucial role in the success of this machine, and Commodore are going to be disappointed if this might be the last offer to readers is to watch this space.



can also be joined together, then creating a seemingly larger sprite. The sprites can then be moved either individually or together. As many as three, four or even more sprites may be



**This month, Your  
Commodore's 'problem page'  
provides a forum for those  
wishing to contact other  
Commodore fans.**

# INPUT

## INPUT

Please can you tell me how to load a machine code program at an address outside BASIC so that I can load it directly later on.

Suppose I LOAD it, either directly or by a BASIC program from DATA lines, a 100-line machine code program starting at address \$C000 (\$C500 if using a monitor e.g. CIMA Micro Assembler Development Systems). I can, of course, SAVE the machine code program by "L PROGRAM", SAVE BASIC by "L" and then load it later by "LOAD PROGRAM", & so on, without using the monitor.

Can I get the same result directly from BASIC, i.e. without resorting to the monitor to SAVE? If so, please could you tell me how to do it.

Mr W. Preece  
Dorset

## OUTPUT

Store the machine code in the area of memory between addresses \$C000 and \$CFFF (i.e. \$F100 and \$C347 decimal). After the machine code has been POKE'd into memory, calculate the hi and lo-bytes of the start and end of your machine code program in decimal.

Then, POKE locations 43 and 44 with the hi and lo bytes of the start of the routine, POKE location 45 with the hi byte #1 at the end of the code and location 46 with the lo-byte. Then, to avoid an out of memory error, the area where the variables start must be altered thus: POKE 53 with the same value as location 43.

POKE 54 with the same value as location 44.

Finally, type in BASIC "program name", L1 and either reset the values to what they were before the switch the machine on and on again.

## INPUT

After searching for several weeks I found a suitable RGB cable to connect my old 484K to a 1040 TV-Monitor. I eventually located a source but I was appalled at the retail price of £79.95. I would therefore appreciate some advice on how to connect up the pins on the relevant DIN sockets (shown below) with a view to constructing my own cable.

Ken Parker  
Tynes and Wigan

## OUTPUT

The Philips plug is an RGB format and the monitor appears to be composite video so, unfortunately, no connections can be made.



- 1 VIDEO INPUT
- 2 GROUND
- 3 AUDIO INPUT
- 4 SYNC INPUT (VCR)
- 5 GND
- 6 AUDIO INPUT
- 7 GND



- 1 L. AUDIO IN
- 2 AUDIO IN
- 3 AUDIO IN
- 4 VIDEO IN
- 5 AUDIO IN

## INPUT

In the last issue of Your Commodore, you included a program listing of Chess Pulver by P.G. Tour. As I own a Commodore 64, and was interested in this game, I was disappointed to discover that this program was for cassette and not disc. I have the Commodore Disc Drive 1541 and would like to load the program on to disc. Could you please tell me the best way to do this? The content of the magazine is the best of any dedicated to the Commodore 64 - keep up the good work!

M.J. Dingley  
Wendlebury

## OUTPUT

This is very simple. Replace the LOAD in part 3 with LOAD "P7". & Replace the LOAD in \$7100 with LOAD "P7". & in part 3. Name the 3 programs Chess, P6, P7.

## INPUT

On page 47 of the December 84 issue, I read of a device called a "sequencer". Cannot find it anywhere! I am a musician and very interested in the MIDI system. If it could show it from my list, I would be grateful.

The device I refer to has never been heard of in the software marketing stores in Australia (which I suspected) so could you please forward me the address and details of where I could get one from or suggest a place, say.

Yours, J. J.

## OUTPUT

Sequential Circuits are an American firm whose products are definitely available in Australia. I suggest that you phone around some of the larger music or computer stores in Queensland. They should be able to help you.



## PROGRAMMING PROJECTS

**QUANTIFYING THE FORM OF PRO-**  
grams used to display real-world three-dimensional shapes. A computer-aided design program must be able to describe, so that it appears on a screen, the shape of the objects that they are designing. Adventure games with convincing graphics have a considerable edge over text-based games. But these, and other programs, are useful to help at hand a simple means of measuring the shapes.

One way of generating three-dimensional shapes is to start with the profile of an object, such as the one shown in Figure 1, and to rotate it through a complete circle about a vertical axis. Figure 2 shows how this simple point-and-click generator can create a three-dimensional object. It can be help or, and/or other means of rotation, to create the object by rotating its points at equally spaced positions around the circle and to draw it as each of these positions. Figure 3 shows the plan view with the axis of rotation at the center of the rotation where the equally spaced positions around the circle are used, and Figure 4 shows the resulting object with a texture.

Our program is to write a program that we'll accept a number of facets, and  $n_1$ , then draw the three-dimensional object with the given number of facets that is produced by rotating the profile. Figure 2 shows the sort of result, to wit the program

CALL R, 100

1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 26

We shall begin by preparing the hardware for the solution program we intend to call on. Obviously, the program will need to display its results on the high-resolution graphics screen, and so it will require hardware, because to prepare the lot to do this, we have used a routine for that in an earlier project. With a reminder that it takes a fair time to do it, just a table entry for this, starting at line 100, is shown in *Figure 1*.

The drawings of the three-dimensional shapes will be compared to straight ones. This means that it will be a good idea to have a substitute for drawing a straight line that we can use. It will work by drawing a dot at every position along the path of the line from one end to the other. We have used

```
500 POKE 53272, PEEK(53272) OR 8
510 POKE 53265, PEEK(53265) OR 32
520 FOR I=8192 TO 16192: POKE I, 0:NEXT I
530 FOR I=1024 TO 2023: POKE I, 22:NEXT I
540 RETURN
```

100

```

1000 RO=INT(R/8): CO=INT(C/8)
1010 L=R AND 7
1020 BIT=7 - (C AND 7)
1030 BYTE=6192+RO+328+CO*8+L
1040 POKE BYTE, PEEK(BYTE) OR 2*BIT
1050 RETURN

```

100



Subroutine 3

```

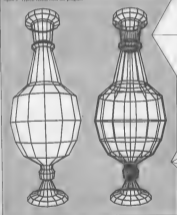
2000 DIM X(1), Y(1)
2010 IF DIM(1) THEN 2070
2020 FOR C=1 TO 12 STOP GOING ON
2030 R=INT(C/4)+C-41:R/R/240
2040 GOSUB 1000
2050 NEXT C
2060 RETURN
2070 C=1
2080 FOR R=1 TO 40 STOP GOING ON
2090 GOSUB 1000
2100 NEXT R
2110 RETURN
    
```

Subroutine 4

```

10 GOTO 6
20 DIM X(10), Y(10)
30 DIM SP(10), VP(10)
40 DIM S(10), Z(10), V(10)
50 FOR K=1 TO 10
60 R=INT(X(10)/240), Y(10)
70 NEXT K
80 DATA 3
90 DATA 18, 28, 9, 16, 7, 12, 2, 8
100 DATA 2,3, 4, 2, 8, 5,-4, 6,-8, 9,-12
    
```

Figure 3. Typical results from the program



equation for plotting a dot calculates C and now R, so the screen in an earlier program is shown in Subroutine 2.

A subroutine for drawing a line only needs to keep finding the appropriate distances for C and R to this subroutine. Figure 4 shows the relationship between C and R for the points along a line

between the points (X1, Y1) and (X2, Y2). The distance between the y-coordinates of the end points of the line is stored under DY and the distance between the x-coordinates under DX. The slope of the line is then given by DY/DX. Line 2010 in subroutine 3 is used division by zero when a line is vertical. C ranges

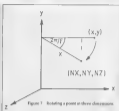
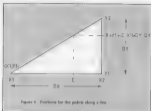


Figure 4. Positions for co-located rotation



Figure 5. Object generated with six facets

from 1 to 100 where the instructions for drawing a vertical line begin. The subroutine for drawing a line from (X1, Y1) to (X2, Y2) by drawing a dot at the appropriate position in every column from column X1 to column X2 is shown in Subroutine 3.



Subroutine 4

```

228 XI=100+X(I): YI=Y(I)
229 FOR J=2 TO H
230 XJ=100+X(J) YJ=Y(J)
231 GOSUB 2000
232 XJ=XJ+ XI*W2 YJ=YJ+
233 NEXT J

```

Figure 8: How to draw a point in three dimensions



Subroutine 5

```

129 Y0=Y(I): Y0=Y(I)
130 FOR K=2 TO H
140 IF Y0<Y(K) THEN Y0=Y(K)
141 IF Y0<Y(K) THEN Y0=Y(K)
142 NEXT K
143 FOR K=2 TO H
144 X(K)=X(K)+128/Y0 - Y0
145 Y(K)=48+Y0 - Y(K)+128/Y0 - Y0
146 MP(K)=X(K): MP(K)=Y(K)
147 NEXT K

```

Subroutine 6

```

34 DIM MP(2), W(2)
35 MP(2)=X(I): MP(2)=Y(I)
36 FOR K=2 TO H
37 X(K)=100+X(K) Y(K)=Y(K)
38 XJ=X(K)+ X(K) YJ=Y(K)
39 GOSUB 2000
40 NEXT K
41 FOR K=2 TO H
42 MP(K)=X(K): MP(K)=Y(K)
43 NEXT K

```



The arrays *X*(*N*), *Y*(*N*), *X*(*N*) and *Y*(*N*) are declared a line 40. The path *n* is chosen using the same code as was used to draw the original profile (but with references to *X* and *Y* replaced by *X*(*N*) and *Y*(*N*)). Although it was a more profitable *n* to write a subroutine for this, instead of repeating the code, the contents of arrays would have to be swapped around to interface the subroutine to the program. As only a few lines are involved, it is simpler to repeat them. This gives us Subroutine 7.

Running the program as it stands now will give a fairly convincing display, but it is improved considerably if each of the points that is used to describe the profile is joined to the corresponding point on the next profile. Adding these lines considerably improves the apparent solidity of the resulting image. To do this, we must use the points on the previous profile so that they are as close

when the new one is drawn. The *n*- and *y*-coordinates, respectively, of the previous profile are used in arrays named *Y* and *Y*(*N*). These arrays are declared at line 40 involved at line 308, used to store the required lines in lines 390 to 430, and updated for the next time at lines 440 and 460 - see Subroutine 8.

The entire program is shown in Figure 9.

## Further developments

The ways in which you can extend and enhance the program include the following:

- The line-drawing subroutine can be improved by drawing a dot in every row, rather than in every column as is proved, if the slope of the line is

greater than one.

- The program can be extended so that it does not draw the lines that way, it by feature from the vertices, drawing only the visible facets. This can be done by changing the number of repetitions required by line 380.
- The scaling system can be changed. Different scalings can be used for the *x*- and *y*-coordinates to produce a distorted image of the object for display.
- If you can fill in some of the facets with colour, it will enhance the image.
- The points used can be rotated rapidly on a circular path, but can take positions on an arc of some other curve. A 'cruddy' curve will give interesting results.
- Different levels of perspective to the eye of line 330 can be used.

## Program Listing

```

10 INPUT "NUMBER OF FACTS": F
15 DIM H
20 DIM X(N), Y(N)
30 DIM X(N), Y(N)
40 DIM X(N), Y(N), X(N), Y(N)
50 FOR I=0 TO 1
60 X(N)=X(N)+1
70 NEXT I
80 DIM X(N), Y(N)
90 DIM X(N), Y(N)
100 DIM X(N), Y(N)
110 DIM X(N), Y(N)
120 DIM X(N), Y(N)
130 DIM X(N), Y(N)
140 DIM X(N), Y(N)
150 DIM X(N), Y(N)
160 DIM X(N), Y(N)
170 DIM X(N), Y(N)
180 DIM X(N), Y(N)
190 DIM X(N), Y(N)
200 DIM X(N), Y(N)
210 DIM X(N), Y(N)
220 DIM X(N), Y(N)
230 DIM X(N), Y(N)
240 DIM X(N), Y(N)
250 DIM X(N), Y(N)
260 DIM X(N), Y(N)
270 DIM X(N), Y(N)
280 DIM X(N), Y(N)
290 DIM X(N), Y(N)
300 DIM X(N), Y(N)
310 DIM X(N), Y(N)
320 DIM X(N), Y(N)
330 DIM X(N), Y(N)
340 DIM X(N), Y(N)
350 DIM X(N), Y(N)
360 DIM X(N), Y(N)
370 DIM X(N), Y(N)
380 DIM X(N), Y(N)
390 DIM X(N), Y(N)
400 DIM X(N), Y(N)
410 DIM X(N), Y(N)
420 DIM X(N), Y(N)
430 DIM X(N), Y(N)
440 DIM X(N), Y(N)
450 DIM X(N), Y(N)
460 DIM X(N), Y(N)
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660 DIM X(N), Y(N)
670 DIM X(N), Y(N)
680 DIM X(N), Y(N)
690 DIM X(N), Y(N)
700 DIM X(N), Y(N)
710 DIM X(N), Y(N)
720 DIM X(N), Y(N)
730 DIM X(N), Y(N)
740 DIM X(N), Y(N)
750 DIM X(N), Y(N)
760 DIM X(N), Y(N)
770 DIM X(N), Y(N)
780 DIM X(N), Y(N)
790 DIM X(N), Y(N)
800 DIM X(N), Y(N)
810 DIM X(N), Y(N)
820 DIM X(N), Y(N)
830 DIM X(N), Y(N)
840 DIM X(N), Y(N)
850 DIM X(N), Y(N)
860 DIM X(N), Y(N)
870 DIM X(N), Y(N)
880 DIM X(N), Y(N)
890 DIM X(N), Y(N)
900 DIM X(N), Y(N)
910 DIM X(N), Y(N)
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930 DIM X(N), Y(N)
940 DIM X(N), Y(N)
950 DIM X(N), Y(N)
960 DIM X(N), Y(N)
970 DIM X(N), Y(N)
980 DIM X(N), Y(N)
990 DIM X(N), Y(N)
1000 DIM X(N), Y(N)

```

Figure 9 The complete program

# The Band's On The Run!

...7 busy characters, 10 lost chords, 15 hours, 48 Traffic Wardens,  
95 London Tube Stations, 126,720 square feet of London,  
7 million Londoners ... 943 action filled screens.

PAUL MCCARTNEY'S *Give my  
regards to*

# BROAD STREET

The new single is missing and the band have  
gone home for the weekend - leaving you  
just 15 hours to re-create the missing tune.

A race against time around London to  
find each member of the missing band.  
You have to watch out for blue  
meanies, wardens and Ruff! A  
clever strategy game, full of  
excitement, brilliant graphics  
and all wrapped-up with  
McCartney music!



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For the Spectrum and Commodore 64/128

Available from W H Smith, Menzies, Lloyds  
and all good Computer Stores

**DAILY EXPRESS**  
says  
**'STUNNING'**



A.P., and D.J.

Stephenson tie  
together the  
subroutines which  
form the basis of a  
filing system into a  
complete program.

# T · H · E E · A · S · I · E F · A · C · T · S

EAST MONTH, WE DEALT with a few of the most subroutines which might form the basis of a complete filing system. THF article is devoted entirely to one program which ties them together. Although the program is complete in the 1, it is hoped that you will alter it to suit your own needs and perhaps add additional options. It is written for tape files but it would be a simple matter to change the OFH statements to suit disc-based files. The complete listing is shown in Program 9.1.

## Using the program

On first running the program, the complete menu of options is displayed; a thought, as first there are only two possible choices: create a file or load an existing file, providing of course that one exists on tape. If any other option is selected, the "two file loaded" messages displayed and the menu, regained by pressing any key.

### Option 1: Create file

The first screen message asks for an estimate of the maximum number of records expected and the number of fields in a record. If you have just keyed in this program and you are in the testing stage, you should try out the program first with 1, say, ten records and more fields to produce a test data tape. It won't do for other too small, creating a long and valuable data for before the program has been fully tested using all options with a short duration test file.

Next, you are asked to enter the file headings. We suggest NAME, TITLE, PHONE and OCCUPATION for the first

file. But, there is a little snag. In order for the sort function to operate correctly on numerical columns, you must guess, where necessary, sufficient leading zeros to make all numbers contain the same number of digits. This is because all numbers are converted to strings. These problems over, you will be asked to enter the actual data under each field heading. The current record number is always displayed at the top of the screen while data is being entered. When the current key board session is ended, key is 0 will to return the menu page. Remember, you don't have to complete the whole file in one sitting. As soon as you are tired, you can save the file in an unformatted state and reload it later to carry on where you left off. The one difference is that you will then be adding new records to an existing file so you will need Option 5, "Add records" instead of Option 1, "Create records".



### Option 2: Load file

This can be a dangerous action to choose because any file already existing in RAM would be destroyed by overwriting it with the new file. To guard against using this to replace you are warned of the danger and can get out of the menu and regain the menu by pressing any key other than the space bar. Once you press the space bar, the new file starts to load over the existing file - so mark carefully!

### Option 3: Save file

You supply the file name, which must not exceed 16 characters. You must arrange the controls of the cassette unit and the ending position of the tape used to receive the file.



### Option 4: Display file

Before using a file, it is comforting to look at it before actually commencing into Option 4 will do this for you by displaying a page of records at a time. The key field is always present, but one of the other fields can be sorted into a page by using the number keys. (This was explained in last month's issue when we described most of the subroutines in detail.)

### Option 5: Add records

As mentioned above, this is used to add further records to the already existing in RAM. The record number is entered at the top of the screen indicates the number of the one you are about to add.

### Option 6: Modify any field

We all make mistakes so this will be a popular option, too. It will be asked for the key field of one offending record. The first one or two characters are sufficient, and then the party at fault will be requested modification. The field data must then be completely re-entered to ensure the

correction has gone in, have a peek at the file using Option 4.

### Option 7: Sort by any field

Humans like things in order, particularly a alphabetical or numerical order. When you enter data into a file, it is often too much trouble to re-arrange the data in order before it is entered. Also, it would be quite out of the question to re-enter the entire file because a new column. Thomas L. has to be entered between Thomas M. and Thomas P. Obviously, we should make the computer earn its keep and make it do the sorting afterwards - hence, Option 7.

To ensure maximum versatility, the file can be sorted under any field heading. For example, we may, for some reason, keep only to numbers, like the file to be arranged in alphabetical order under OCCUPATION instead of name or perhaps, numerical order under TITLE PHONE. Because of this, the program "Options on which field?" must be answered. If you want to sort under TITLE PHONE, it is sufficient to enter 0, or even 1. The entire file will then be sorted in numerical order of telephone number, providing of course the leading zeros were correctly entered.

### Option 8: Check data free

When the number of records begins to grow - and they will - you should often take advantage of the option to see how many bytes are left. We should have made this a permanent feature at the time of the "Add records" display but this involves considerable housekeeping details which are

BASIC interpreter clears up the disk by using a separate option, the disk is more likely to be in a state.

#### Option 9: Delete record

The record to be deleted is found as except of the first one or two characters of the key. The 'key' in the file is a summary of the record so you don't have to worry about wasted disk space.

#### Programming details

The listing consists of the collection of subroutines which we treated in some depth in previous. All that was needed to turn them into Program 5 is some basic code, such as initialization and a menu. Figure 9.1 is a simplified structure diagram of the program and will help you to understand the overall plan and, in particular, how to trace the GOTOs from the ON GOTO statement.

Line 208 is a trap open and prevent selection of certain options when there is no file present.

#### Suggestions for files

Having a filing system is one thing but knowing what to file is another. A file on names, regions and occupation was quite suitable as a simple example but, in practice, it would be rather a hassle to maintain. The following suggestion may be useful as a guide to the kind of information worth putting on a computer.

The books have a list for major cities of all towns in each area, for computer numbers. A file of suggestions can grow to an alarming length because most of us can't think of things, or think away, but in case some particular article has to be looked up, the books carry when you want to find the chosen article. To avoid periodic losses of time, it is worth spending some time in the day putting all the grade headings into some order. Program 5, plus some disk and keyboard work, will do just that.

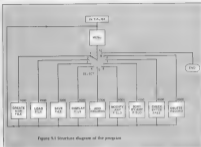


Figure 9.1 Structure diagram of the program

#### Program Listing

```

10 REM NEW FILING SYSTEM FOR CASSETTE
20 FL1=0:FL2=0:NM="FILE NOT NAMED"
30 GOSUB 12000
40 GOSUB16000
50 PRINT"11) CREATE NEW FILE"
60 PRINT"12) LOAD FILE"
70 PRINT"13) SAVE FILE"
80 PRINT"14) DISPLAY FILE"
90 PRINT"15) ADD RECORD"
100 PRINT"16) MODIFY ANY FIELD"
110 PRINT"17) SORT BY ANY FIELD"
120 PRINT"18) CHECK BYTES FREE"
130 PRINT"19) DELETE RECORD"
140 PRINT"19) END PROGRAM"
150 PRINT"110) END PROGRAM"
160 PRINT:PRINT:INPUT"SELECT OPTION ">SX
170 PRINT CHR$(147)
180 IF SX=1 OR SX>10 THEN 40
190 IF SX=3 AND FL1=1 THEN 11000
200 IF SX=2 AND FL2=0 AND SX>10 THEN PR
INT"NO FILE PRESENT":GOSUB15000:RUM
210 ON SX GOSUB 1000, 2000, 3000, 4000, 5000
, 6000, 7000, 8000, 9000, 230
220 GOTO40
230 END
997 REM *
998 REM **
999 REM CREATE FILE SUBROUTINE

```

```

1000 PRINT CHR$(147)
1010 PRINT"ENTER FILE SIZE (NUMBER OF RE
CORDS) "
1020 INPUT FCS
1030 IF FCS<1 THEN 1010
1040 PRINT"ENTER NUMBER OF FIELDS REQUIR
ED 12-100 "
1050 INPUT NFX
1060 IF NFX<3 OR NFX>10 THEN 1040
1070 NFI=NFX-1:DIM A$(NFI,FCS)
1080 PRINT CHR$(147)
1090 FOR F=0 TO NFI
1100 PRINT"ENTER FIELD HEADING"*(F+1)
1110 GOSUB20000:AR=F,0=0#
1120 NEXT
1130 GOSUB5000
1150 FI=1
1160 RETURN
1997 REM *
1998 REM **
1999 REM LOAD FILE SUBROUTINE
2000 INPUT"ENTER FILENAME ":(NM
2010 OPEN I,I,O,NM
2020 INPUT#1,FCS,NFX,FLX
2030 DIM A$(NFI,FCS)
2040 FOR R=0 TO FLX
2050 FOR F=0 TO NFI
2060 INPUT#1,A$(F,R)
2070 NEXT
2080 FI=1
2090 CLOSE#1
2100 RETURN
2997 REM *
2998 REM **
2999 REM SAVE FILE SUBROUTINE
3000 INPUT"ENTER FILENAME ":(NM
3010 OPEN I,I,I,NM
3020 PRINT#1,FCS:PRINT#1,NFX:PRINT#1,FLX
3030 FOR R=0 TO FLX
3040 FOR F=0 TO NFI
3050 PRINT#1,A$(F,R)
3060 NEXT
3070 CLOSE#1
3080 RETURN
3997 REM *
3998 REM **
3999 REM DISPLAY FILE SUBROUTINE
4000 C=1:G=1
4010 PRINT CHR$(147):PRINT"PRESS SPACE B
AR TO REACH MENU
4020 PRINT L#
4030 PRINT A$(0,0) TAB(20) A$(C,0)
4040 PRINT L#:(G=G+1)
4050 IF G>FLX THEN G=FLX
4060 FOR R=0 TO G:PRINT A$(0,R) TAB(20)
A$(C,R):NEXT
4070 GET K$:IF K#"" THEN 4070
4080 IF K#CHR$(32) THEN 4100

```



```

7040 FOR C=0 TO NF2
7100 A=ASC(C,R):A=C,R=ASC(R-N2):A=C,
R=N2:A=C
7110 NEXT
7120 NEXT
7130 NEXT E
7140 NEXT
7150 IF N2>1 THEN 7040
7160 RETURN
7797 REM *
7798 REM **
7799 REM BYTES FREE SUBROUTINE
8000 PRINT CHR$(147):PRINT"BYTES FREE":PRINT
8010 B=FREE(0)-16384:PRINT"BYTES FREE"
8020 PRINT"NUMBER OF BYTES FREE"
8030 GOSUB15000
8040 RETURN
8797 REM *
8798 REM **
8799 REM DELETE RECORD SUBROUTINE
9000 GOSUB14000
9010 PRINT CHR$(147)
9020 PRINT"RECORD TO BE DELETED"
9030 PRINT L$
9040 FOR C=0 TO NF2
9050 PRINT A=C,C:TAG(20):A=C,R
9060 NEXT
9070 PRINT L$:PRINT
9080 PRINT"DELETE THIS RECORD (Y/N)"
9090 GOSUB25000
9100 IF K=0 THEN 9170
9110 IF FL3=1 THEN 9160
9120 FOR F=0 TO NF2
9130 A=F,R=A(F,R+1)
9140 R=R+1
9150 IF R=FL3 THEN 9110
9160 FL3=FL3-1
9170 RETURN
10797 REM *
10798 REM **
10799 REM SECOND CHANCE SUBROUTINE
11000 PRINT"CAUTION : OPTION DESTROYS LO
ADED FILE"
11010 PRINT:PRINT
11020 PRINT"PRESS SPACE BAR TO CLEAR FIL
E"
11030 PRINT:PRINT"PRESS ANY OTHER KEY TO
REGAIN MENU"
11040 GET K$:IF K$="" THEN 11040
11050 IF K$=CHR$(13) THEN REM
11060 GOTO40
11797 REM *
11798 REM **
11799 REM DRAW LINE SUBROUTINE
12000 L$=""
12010 FOR K=1 TO 27
12020 L$=L$+CHR$(99)
12030 NEXT

```

```

12040 RETURN
12997 REM *
12998 REM **
12999 REM FIND FIELD SUBROUTINE
13000 PRINT CHR$(147);F=-1
13010 PRINT"OPERATE ON WHICH FIELD? (GIV
E HEADING)"
13020 GOSUB25000
13030 F=F+1
13040 IF K$=LEFT$(A$+F,0),LEN(K$)) THEN
13070
13080 IF F=0 THEN 13030
13090 PRINT CHR$(147);PRINT"NO SUCH FIEL
D"
13095 GOSUB15000:GOTO13000
13070 RETURN
13997 REM *
13998 REM **
13999 REM FIND RECORD SUBROUTINE
14000 PRINT CHR$(147);R=0
14010 IF G$=4 OR G$=7 THEN F=0
14020 PRINT"GIVE RECORD ENTRY UNDER "A$
+F,0
14030 GOSUB25000
14040 R=R+1
14050 IF K$=LEFT$(A$+F,R),LEN(K$)) THEN
14080
14090 IF R=0 THEN 14040
14070 PRINT CHR$(147);PRINT"NO SUCH RECO
RD"
14075 GOSUB15000:GOTO14000
14080 RETURN
14997 REM *
14998 REM **
14999 REM PRESS ANY KEY SUBROUTINE
15000 PRINT:PRINT"PRESS ANY KEY TO CONTI
NUE"
15010 GET K$:IF K$="" THEN 15010
15020 RETURN
15997 REM *
15998 REM **
15999 REM TITLE/STATUS SUBROUTINE
16000 PRINT CHR$(147);PRINT L$
16010 PRINT"    COMPACT RAM BASED FILING
SYSTEM"
16020 PRINT L$
16030 IF F1=0 THEN PRINT"FILE NOT PRESEN
T"
16040 IF F1=1 THEN PRINT"FILE LOADED: "
16050 PRINT
16060 RETURN
24997 REM *
24998 REM **
24999 REM INPUT VALIDATION SUBROUTINE
25000 K$="":INPUT K$
25010 IF K$="" THEN 25000
25020 IF LEN(K$)>10 THEN K$=LEFT$(K$,10)
25030 RETURN

```

READY.

What's a holiday last summer?

It was just the time when

Commandment Challenge

should have been a dilemma

ATTENTION ALL PLEASANT-MINDED, proving Your Commandment readers! Oh, so you're not allowed to drink in pubs or drive a car or do any of those legal things which were so much of us older folk's time. But, this month at least, you are the privileged group of four Commandment readers. If so, only if you are 16 years of age or under will your's star prize be of any value to you. Of course, you are glad to be older friends may envy - but, they can't keep the prize.

Consider water-skiing, fishing, swimming, tennis, sailing and computer! If you think this is an unlikely feature you've never heard of Ardmore Adventure holiday camps.

Ardmore are out to prove that education can be fun. On one of their special adventure holidays, you will spend 2-4 hours at the computer and the rest of the day having part in a whole host of leisure activities such as badminton, basketball, B&B taking, dancing, drama, kayaking, judo, pottery, rifle shooting, trampolining, treasure hunts and lots, lots more. There's something to suit every taste.

The camps are small enough to ensure that the campers receive personal care and attention but large enough to offer a wide range of activities and opportunities to meet new people with similar interests.

Those who choose competing at a specialist activity (such as our special four Commandment reader will) are taught to program under expert supervision. There is one computer (plus peripherals) per child and a teacher for every 3 pupils. There is no rigid syllabus, every child is encouraged to proceed at their own pace. The camp even awards qualifications, recognises for progress and skills in specialist activities and courses.

There is a choice of residential or non-residential camps. They are held at three main sites - Marlborough School's Dorset woodland Park in Chalfont St. Giles and at Ascot. There are three age groups - 4-8 years, 7-11 years and 12-16 years. What a golden opportunity for parents to get rid of their kids for a week (or, more to the point, 3 chances for kids to escape from their parents).

Why are we telling you all this? You, you've guessed, we're offering our lucky prize winner a week's holiday at one of Ardmore's activity camps. The holiday will be at their Chalfont St. Giles centre and should be taken at the end of August. The second prize is an Ardmore summer camp (weekend) and the third prize is an Ardmore summer camp (1 short

# COMP



David Walker, Camp Director

## How to enter

It's so simple. All you have to do is answer five easy multiple choice questions and write the answers clearly on the back of the envelope in which you send your entry otherwise we will not be able to accept it. The answers should be written on the envelope in the same order as the questions. There is no need to write the question numbers on the back of the envelope. For example, if you think the answer to question number 1 is John

McNeece, then the first letter will be C, and so on.

Since this is an activity holiday, the questions are all connected to sport. You may prefer as many times as you wish but each entry must be on an official coupon and sealed in a separate envelope. Please write clearly on the coupon as it will be used as a label if you win a prize.

Fill in your answers, name and address on the entry coupon and send it to Ardmore Competitions, Four Commandment, 1 Golden Square, London W1R 1AB. The closing date for the competition is last post on Friday 28th June.

### 1. Football

- 1) Which of the following tennis players has won the Wimbledon Men's Singles title 5 times?  
a) Bjorn Borg  
b) Rod Laver  
c) John McEnroe

- 2) Which football team have their home ground at Old Trafford?  
a) Arsenal  
b) Southampton  
c) Manchester United

- 3) For which country does Ian Botham play cricket?  
a) Yorkshire  
b) West  
c) Somerset

- 4) Who won the 500cc Grand Prix Motor Championships in 1964?  
a) Mike Hail  
b) Johnnie Dorey  
c) Nigel Cameron

- 5) Where were the 1964 Olympic Games held?  
a) Rome  
b) Los Angeles  
c) Moscow

# COMPETITION



Fun at your fingertips



Swimming along



What a lot of fun



On your bike

## How to Enter

Entries will not be accepted from employees of Angus Special Ad Publications Ltd, their printers and distributors, and Ardmore Adventure Ltd.

This competition also applies to employees' families and agents of the companies.

No correspondence will be entered into with regard to the competition results and it is a condition of entry that the editor's decision is final.

The How to Enter section forms part of the rules.

## Ardmore Adventure Competition

To give yourself a sporting chance, fill in the entry coupon (block letters please)

Name

Address

Postcode

We entrust you

Remember to write your answers on the back of the envelope as your entry will be judged.











[illegible]





This is all well and good, and makes me look like a physics whiz, but what do you actually do?

Well, in order to make a note from the computer, you must (PCs) know numbers for the High Frequency (HF) and the Low Frequency (LF) values. In order to find HF and LF for a given frequency of your note, use the following equations. For example, the pitch for the note of A (over middle C) is 440 Hz. To split this into the HF and LF we must type in "440 Hz".

This program breaks the frequency down into units usable to the 485 Hz source. 440 Hz gives a result of HF=07, LF=38, which according to the Commodore 64 manual is spot on (see the following table).



Note/Octave	HF	LF	Note/Octave	HF	LF
C 1	1	38	C 4	17	37
C #1	1	38	C #4	18	42
D 1	1	32	D 4	19	53
D #1	1	70	D #4	20	100
E 1	1	90	E 4	21	104
F 1	1	110	F 4	22	237
F #1	1	110	F #4	24	53
G 1	1	110	G 4	25	107
G #1	1	179	G #4	27	98
A 1	1	200	A 4	28	274
A #1	1	237	A #4	30	107
B 1	2	6	B 4	32	94
C 1	2	37	C 5	34	70
C #1	2	68	C #5	36	61
D 1	2	100	D 5	36	136
D #1	2	140	D #5	40	200
E 1	2	179	E 5	43	53
F 1	2	220	F 5	45	198
F #1	2	8	F #5	46	127
G 1	2	34	G 5	51	97
G #1	2	100	G #5	54	191
A 1	2	100	A 5	57	172
A #1	2	210	A #5	61	136
B 1	4	12	B 5	64	100
C 2	4	70	C 6	66	148
C #2	4	179	C #6	73	168
D 2	4	200	D 6	76	202
D #2	4	25	D #6	81	160
E 2	4	800	E 6	86	205
F 2	4	100	F 6	91	140
F #2	4	16	F #6	86	234
G 2	4	100	G 6	102	794
G #2	4	200	G #6	108	220
A 2	7	33	A 6	116	88
A #2	7	160	A #6	120	12
B 2	8	33	B 6	129	120
C 3	8	147	C 7	137	45
C #3	8	31	C #7	145	81
D 3	8	100	D 7	153	247
D #3	8	60	D #7	163	31
E 3	8	200	E 7	172	210
F 3	11	174	F 7	180	25
F #3	12	32	F #7	190	257
G 3	12	276	G 7	205	915
G #3	13	156	G #7	217	960
A 3	14	167	A 7	226	104
A #3	15	70	A #7	244	100
B 3	16	47			

#### Music software

There are a number of pieces of software available that allow the user to branch from the marvels of the SID chip, without having to program it all in yourself. The first of these is *Music Maker* (Commodore), this is the one with a plastic overlay keyboard, and it effectively turns your 64 into a sophisticated Casio. You have options to sequence the keys, play notes or polyphonically, and change the sounds of the synth with single keypresses. Not a bad little package, but a little limiting in the end. Good for people who are used to a musical keyboard!

*Synth 64* (Atari/AtariSoft) is less of a performance synth or sequencer, but more of a programmer's aid. It lets you write music using mostly the note letters A, C, D etc. This is all very nice, but it is a bit complicated, and as such you'd be better off programming in BASIC!

*Musical Composer* (Electronic Arts) is exactly that; a first class music composer, allowing you to compose music on a stage. When you've done it though, you can't print out the results and you can't change the sound of the voices. A bit of an enigma, this one.

*Multi-timed Synthesizer* (Ramsis) is a super performance synth/sequencer, featuring amongst other things, a real-time play that you don't get with other computer synthesizers.

But none of these are nearly as comprehensive and user friendly as *Music Master* (Supersoft) which is easy to use, well laid out and well documented.



#### What's on next month

Interviews are making code routines which give an impression of movement and sound happening simultaneously. I'll be explaining all about them, and giving more detail about synths too.

All products are guaranteed for one year unless otherwise stated. Payment may be made by American Express Card, Bankers draft, Building Society cheque, cash or postal order. Sorry, cheques need five days for clearance. We reserve the right to change prices without prior notice. All prices are inclusive of VAT. Please check before ordering for exchange rates.

If you never believed  
mental arithmetic  
could be a painless  
process, try this  
Commodore 64 game  
from Christopher  
Horvath.

# GRID CRIB

TWO PLAYERS ARE PROVIDED, one for the player and one for the computer. The object of the game is to find all two different chains made up of two colored blocks in your grid, before the computer completes its grid.

The computer will give you a mathematical question. If you answer correctly, you must pick a square.

If the square is yellow, your turn ends. If it's any other color, you must select another square. The computer

selects squares used in play a piece at a time, after which the player has another turn.

The colors and the questions are selected randomly so no two games are the same.

```

1 REM C64
2 POKE 53280,2:POKE 53281,8:CH$="GRIDCRIB: 1P: "
10 G1=10:G2=10
20 REM CLR
100 DIM G1(5),G2(5):PRINT" "
200 REM FILL IN GRID
300 FOR X=1 TO 5
400 FOR Y=1 TO 5
500 A=INT(7*RAND(1)+1)
600 B=INT(7*RAND(1)+1)
700 IF (A,B,X) <> (B,X,5) THEN
800 G1(A,B,X)=A*10+B*10+1
900 G1=(INT(2*4*ND(1)+1)+4+1)*7+4+1:G2=(INT(2*4*ND(1)+1)+4+1)*7+4+1
1000 G2=(INT(2*4*ND(1)+1)+4+1)*7+4+1:G2=(INT(2*4*ND(1)+1)+4+1)*7+4+1
1100 IF (G1(A,B,X),G2(A,B,X)) <> (G2(A,B,X),G1(A,B,X)) THEN
1200 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
1300 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
1400 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
1500 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
1600 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
1700 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
1800 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
1900 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
2000 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
2100 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
2200 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
2300 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
2400 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
2500 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
2600 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
2700 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
2800 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
2900 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
3000 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
3100 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
3200 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
3300 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
3400 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
3500 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
3600 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
3700 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
3800 G1(A,B,X)=G2(A,B,X):G2(A,B,X)=G1(A,B,X)
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### Programs | Science

[illegible]







At last, a handful of

the remaining software

titles, mostly released

last fall, that deserve

positions right here.

Some to watch:

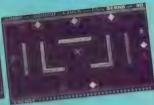
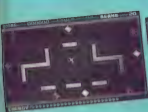
IF YOU BOUGHT A COMMODORE 16 last Christmas you were one of many, and you may now be feeling rather disappointed at the small quantity of good software that has so far appeared. It so chimes up! Large numbers of games are beginning to hit the marketplace, although many of them are reissues from other machines. They are none the worse for that. I have taken a good look at a number of the first offerings from the independent software houses and, although some are poor, several others are well worth buying. For convenience, I have grouped them in categories.

Everybody wants to play at least one game based on Space Invaders, and *Xargon Wars*, from Creative Graphics, is an excellent example of its type. Nothing about the game is original, yet it is colourful, challenging and addictive.

You shoot from the ground at waves after waves of aliens — various types in all — which are intent on bombing you out of existence. The alien races in a variety of tight patterns, so a different strategy is needed for each variety, and there are forms which range from rectangles to giant bats. The crowd obviously isn't of avoiding their bombs, which rain down fast and furious — lightning reactions are necessary. *Xargon Wars* is written in machine code and shows just what can be achieved within 16k of memory. It sets a very high standard for other authors to emulate.

*Tyranoid's Zap-Bot* is in some ways similar, but now you are able to move vertically, up to about a third of the way up the screen. For some peculiar reason the aliens are attacking in helicopters, though later waves change to cubes and thing saucers. Some of them drop bombs which look like letters. I've thought the main problem lies in avoiding the aliens themselves, as they wander gaily from right to left, gradually getting lower as they proceed. Rather luckily, some of them have been made invulnerable, so you have to dodge them and not ask, why, oh why, keep away. The game is well conceived, but suffers slightly from a lack of variety. It is also frustrating that you can only fire one shot at a time, but nevertheless it is fast and quite addictive.





At 14.99, Microdual's *Arena 2000* is quite a bit cheaper than most of the other games reviewed. Your task is unashamedly to slaughter everything in sight, after which you start again on a new screen. There are eight different types of opponent, each which has its own pattern of movement, so you must work out which types must be killed first because they present the greatest danger. Some have to be hit with deadly accuracy, some need more than one hit, while others are really weak so they don't do as much but must be killed before they die.

It is a difficult game, but if it gets too tedious you can employ an assistant to do the living while you sleep, using two sticks. There is not much variety in the game, but it is well programmed, its fast loader is excellent and it represents good value for money.

First impressions of *Arena's* *IBM Commander* are not favourable but once you get into the game you find there is much more to it than meets the eye. You are in a three dimensional shooting arena, with space-pilots swooping erratically towards you. There are a flock to be hit, one of their unpredictable nature, but you must beware of losing ammunition as you have only a limited stock available. There are not replenished until you reach screen three, so even shot must count. After the first screen, various bonuses appear, including Target Reduction, which limits your scoring, and a particularly neat bonus called an Annihilator. Random, when, not surprisingly, starts your stock at 9999999.

The game certainly grows on you, and is really not bad at all. It is a refreshing change from the usual time as fast as you can game, and I found it very enjoyable.

It's no more original in *3D Trek*, which is *Atari*. All the usual features of the *Trek* games are here, although the *Sensors*, the *USS Enterprise* and *Captain Kirk* are not mentioned by name. It is a

mixture of a strategy game and arcade game, where you have to search the galaxy — in this case at 11.99 — and destroy any alien raider. Your energy is limited, so you need to fire a few shots, then come to terms to recharge, and to repair any battle damage. The ship is fully equipped with navigational and battle computers, and has long-range sensors to detect any lurking predators.

The graphics are quite good, without being 'superb', as described in the cassette insert, but the game has a convincing habit of failing to respond unless keys are pressed repeatedly, and on several occasions the program 'hangs completely', so that I had to re-start and wait again. These faults should really have been put right before the game was marketed. A shame, as it is otherwise very good.

*Atari's* *Atariquest*, on the other hand, is beautifully programmed but incredibly difficult. For those not accustomed to games of the *Conquest* type, let me tell you that you are in a garden infested with insects, which, not surprisingly, nothing but musketeers will grow. You have got to find up with the situation that you have taken the rather drastic step of going out to shoot all the insects — in particular a rather nasty well-supplied thing called a mosquito. Unfortunately, each segment has to be shot separately if you are to kill the bee or blowfly while the other insects are attacking it. Insects — or should it be named — and they are very hard to avoid.

The graphics and colour are good, and the sound excellent. There are fifteen different insects, each more difficult than the last, and I confess I failed to get past screen two for those of you with jumping reactions, this game would be unbeatable. For me it was just too hard.

In this review I have mentioned *CR's Berks*, although it occupies a good deal of

shooting as well as dodging. This was my favourite of all the games reviewed, but what a silly title! Perhaps the author, Jim Williams, lives in that county in the north of England?

It turns out that *Berks* are in some sense men, who wander aimlessly around the screen while you, without knowing that you are, do your best to wipe them out. They are parodied, however, by *Drones*, which are distorted-shaped and hostile in on you swimming. The *drones* can not be killed, but only paralysed for a few seconds. Each screen — of which there are no fewer than 12 — contains a variety of obstacles. If you bump into one or three, or into the perimeter wall, you lose control for a while, and then the *drones* can get you. So your task is to steer the *berks* while dodging the *drones* and avoiding the obstacles — easy, really! The game is fast, colourful, original and completely compelling. You know, it's by a man as much as possible.

In complete contrast is *Island Drilling* from Synsoft. The aim of the game is to collect oil fuel pipes from a Paris's surface and, dodging attacks and satellites, to take them to the oil company of a large mother ship orbiting above. At this stage, the space-age bluffs off and you start again on a later level. To find that is what is supposed to happen, but the program has a bug, which kills you every time you succeed in doing a level. The game was written mostly in BASIC with some machine code routines, and by saving the BASIC part I was able to get it to run. It proved quite reasonable, but when it never have been released as a game. Quite unbelievable!

Microdual have taken a similar idea in their *Confident in Space*, but they have turned it into a marvellous and interesting game, which is varied and calls for real skill, not to mention the lower levels. Your spaceship lands on a succession of strangely named planets, where you have to find out, then collect, at least it looks as possible, what is available or shooting the







**Mike Roberts' first project in our D.I.Y. add-on series is a electronics interface for the Commodore 64.**

**JUST MONTHS AFTER INTRODUCING TO the subject of building your own add-on for the C64 told you about all the peripherals you need to make to start.**

By now I assume you own a soldering iron, a pair of pliers, some solder, and some of parts or wire strippers - because you need these to complete this month's project, which is a **electronics interface** for the Commodore 64. This interface is needed because parallel printers are cheaper, more easily used, and a lot faster than the equivalent Commodore ones. The common standard is the only really standard interface in the computer industry, often so-called standards, such as the RS232C interface or data problems.

The way the interface works is simple - eight (or even seven) bits of data transmit the characters to the printer. Two handshaking lines for information transmission between the two devices and everything grounded. Thus the maximum cord length is 50 or 75 feet. However for our purposes we can be using a 30-way cable for the 18 information lines and 18 ground lines (one ground line for each information line - it's safer that way).

You may be wondering what a handshaking line is. Well, one line links the computer to the printer, and the other goes from the printer to the computer. When the computer puts data onto the data lines it pulses its line to the printer to tell it that it's ready, and waits. When the printer "sees" this it reads the data off the data lines and prints it, the printer then pulses its handshaking line to tell the computer to put more data onto the one, and waits. And so the cycle continues.

The C64's two serial data lines and four handshaking lines should now be connected into the previously discussed 18 I/O lines. But, this is not the case. The next part is used as the top side of the 16-pin RS232C port on the left-hand side of the C64.

This port is already well guarded as a common interface, but Commodore in their infinite wisdom, decided not to provide any connection details or driver software. I hope to remedy this.

The driver software provided is supplied by the new Lambda 6400152 to print you use the command L, M to write form '64L, M11' or 'PRINT L, M, N' to stop printing you use L, M again, but with an argument of 0 as in 'PRINT L, M, 0' etc.

I chose this system because I wanted a change from the complex and

# THE HARD FACTS

limitations of having to open a Lur to the printer. I prefer in most cases the BBC micro method of printing, and it was easier for me to program. One small point is that the screen goes momentarily "crazy" I don't know why this happens, but I think it is something to do with I/O priority, if anybody does know about it - please write to Your Commodore as it would be a great help. Also anything printed while print mode is in operation will be so hard to the screen (although you can't see it while information is being transmitted to the printer).

There are some limitations to this system, most commercial software will not run as may need extra modification.

## Construction

How to connect up. Type in either the BASIC listing or the assembly listing and save it somewhere safe - you must load and run this every time you turn the computer on.

You need a 16 way male Amphenol equivalent displacement type connector, a 30-way ribbon cable (all are convenient length - about two metres is common), and a 12 way single ended 8 pin edge connector. Any reputable electronics supplier should have these in stock but Tandy, Multitech Electronics, and Maplin can supply them by mail order if you get into difficulty.

Next you must place the cable flat across the "back" of the Amphenol connector making sure that the end strip

in the cable is going to be gripped by pin 1 (the front of the connector is numbered). At this point you will notice that there are 16 spare connections on the Amphenol connector. Do not fear, nobody is really sure why they are there but they're harmless. When the cable is firmly in place, the back of the connector must be pressed on. This is an irreversible action and must be right first time.

At the other end of the cable you must separate out all the wires for about three inches and strip the insulation. Now every alternate wire must be separated the odd (1) is the wires that start with the end strip are data lines and the others are the ground lines. The ground lines must all be soldered together in two bunches using pins 4 and 9 (all alpha designations and positions on the wire port are in the back of the manual) Next you must connect the pins of the Amphenol and the edge connector in the following sequence:

- B = 11
- C = 1
- D = 1
- E = 4
- F = 4
- H = 6
- I = 7
- K = 8
- L = 8
- M = 1

Now, all you have to do is plug everything in and off you go.

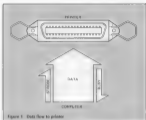


## Basic Listing

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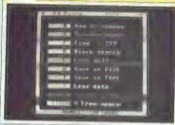
10 rem"*****
20 rem"***
30 rem"***Centronics Driver Software***
40 rem"***
50 rem"*** (c) Mike Roberts 1985 ***
60 rem"***
70 rem"*****
100 l=47150:ln=775
110 ck=0:ln=ln+5:for i=0 to 7:read a:ifa=777
thenend
120 peekl.a:il=1+il:ck=ck+a
130 next i:read c:if c<>ck then print "you've m
ade a mistake in line"ln"- retry:it"
140 goto 110
1000 data0.173.143.11.143.17.3.142. 409
1005 data173.143.16.3.76.166.77.224. 936
1010 data129.240.3.76.150.142.142.0. 983
1015 data134.251.142.0.143.1.221.149. 10
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1020 data0.141.0.221.149.255.141.3. 936
1025 data221.173.2.221.9.4.141.3. 773
1030 data221.149.36.141.38.3.149.173. 77
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1035 data141.49.3.76.73.149.172.141. 953
1040 data25.3.149.101.141.24.3.104. 576
1045 data141.1.221.72.173.13.221.9. 831
1050 data144.141.13.221.149.4.141.0. 833
1055 data221.149.1.133.251.145.251.201.
1349
1060 data0.209.256.104.74.138.135.72. 96
3
1065 data173.13.221.41.14.208.3.76. 751
1070 data71.234.149.251.141.0.221.149. 1
274
1075 data0.141.1.221.133.251.173.13. 933
1080 data221.41.239.141.13.221.149.774.
1377
1085 data141.25.3.149.71.141.24.3. 377
1090 data149.0.141.13.221.104.00.44. 800
1095 data143.138.142.76.3.142.135.142. 9
23
1100 data39.3.76.0.0.0.0.0. 136
2000 data999
ready.

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# BUSINESS FILE



Disk Diary

DIARY SYSTEMS ARE CURRENTLY IN vogue and, thus, are now included in the firmware of many PCs. The value to the user of such a system depends largely upon the individual but it there the advantage of a computer-based diary is lost if it is not kept continuously on-line.

The two packages reviewed here are very different. They are Disk Diary from A2AD and CBM-64 Diary from HandOfMachinist. Both systems compare quite well with other systems which I have seen running on much larger machines than the Commodore 64.

## Disk Diary

The program is two discs (program and data) and is accompanied by a truly comprehensive and professionally presented user guide (56 pages, including a working index).

Once the program is loaded, the user is asked to enter a password followed by the date and time. In fact, the time is of little value once a novel conceals with your watch; it lives only as the system initiation.

Apart from recording appointments, names and addresses, personal notes, etc., it can record quarterly expenditures, revenue tax and bank details. It maintains records on a quarterly basis until the data disc is only able to accept one quarter at a time. The software also interfaces with Day View, Day Calc and Day Journal (2-way, compatible) which should make it additionally attractive to Commodore software users.

An 'appointments window', situated at the top right of the opening menu, provides for a rolling display of 70 days records, with display starting from the Sunday prior to the date entered on load-up. The pointer is easily manipulated by the cursor control keys. Similarly, 'Y' and 'N' commands allow the window to jump ahead or back in sets of 10 days.

Notes are easily maintained and inserted. They are saved to disc-on-cream as Day Scripts formed by use of the F1 and F8 keys respectively.

Other data items are created and have just as easy, although there are restrictions on the amount that can be held in it; only 4 pages are devoted to telephone numbers and addresses. But

there should be sufficient space available for even the most crowded diaries.

The search and analysis facilities are comprehensive, allowing for event recall as well as year and term searches.

A2AD claims that entries can be made as far as advance as 1990, although calculations are available as far ahead as 2037.

The system is written in 8088 assembly language to keep up performance levels and is completely menu-driven. The screen appears are both clear and precise.

Overall, this is a sophisticated and potentially useful addition to any small computer configuration.

## CBM-64 Diary

This package is easily mastered and, as with the majority of cartridge-based systems, loads almost instantaneously. The manual is very sparse but the software is so easy to run and use that a detailed manual is hardly necessary.

64-Diary is more a data storage and retrieval system than a fully-fledged diary. Data is held in blocks (70 lines of 37 character text) and is covered and stored as free-form strings. The user can optionally use block numbers (think of a batch as a scrollful of dates as keys to search). Text searches are quick and responsive.

The system does not pretend to be as all-encompassing as Disk Diary but, if you merely need to store data and dates on an annual basis, it is simple to use and fairly useful.

## On balance

On balance, Disk Diary offers greater value for money since it offers more complete functionality. But the system is a little cumbersome and requires regular maintenance to ensure that the best possible results are achieved. Your choice of system must depend on the use to which you are to put the package.

**Disk Diary**  
Price £24.95  
HandOfMachinist Ltd.  
5 Albert Road  
Crowthorne  
Berkshire  
Tel: 0344 733080

**CBM-64 Diary**  
Price £29.95  
A2AD  
c/o Associated Services Ltd  
21 Chesham Street  
London  
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publication, it will be returned to you.

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Amount of memory program occupies

Other computers/memory size which your program runs on without conversion at all

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No

Have you sent your game to another magazine?

Yes

No

Is it originally a version of a theme?

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Telephone Number

Times to contact you



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